DISPOSITION FORM

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125

[illegible]

The [illegible] for the [illegible] for the survey of Research [illegible] of USAF [illegible] Functions, [illegible] - 7 [illegible] 1958, [illegible]:

[illegible]	**[illegible]**
18 - 19 Jan 58	Tvl - Norton AFB to Washington, D.C.
20-21 Jan 58	Orientation - Hq USAF
22 Jan 58	Orientation - Hq ARDC
23 Jan 58	Tvl and Briefing - Hq [illegible]
23-28 Jan 58	(Two officers will visit Cambridge Research Center (during this period
24 - 28 Jan 58	Survey - RADC
29 Jan 58	Tvl and Briefing - WADC
30 Jan - 4 Feb 58	Survey - WADC
5 - 7 Feb 58	Tvl - Wright-Patterson AFB, Ohio, to Norton AFB
10 Feb 58	Visit AF Ballistics Missile Division, Inglewood, Calif.

* Above dates reflect changes reported in OZIG Msg AFCGM-D-12-366-E

PERSONNEL

The following personnel will perform this survey:

Colonel William H. Hargett	AFSC:	2016
[illegible] Alfred G. [illegible]		[illegible]
[illegible] Willis E. [illegible]		[illegible]
[illegible] Gordon J. [illegible]		[illegible]
Major Wirt D. Walker		[illegible]
		2044

CONFIDENTIAL

FEB 3 - 1958

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[illegible]

[illegible] Selection for WS 117L

an undated

[illegible]

2. At your request, Colonel [illegible] informed General Greal that you had [illegible] of the Board's findings and had requested that the Honorable [illegible], Secretary of the Air Force, be informed of the Board's recommendation, the circumstances of its deliberations, and the anticipated procurement prior to accomplishing the formal procurement negotiations.

3. In compliance with instructions from General Putt's office, General Greal submitted this information in letter form through procurement channels of ARDC the week of 20 January. General Greal's representative handcarried the material to Col. Fulton, Chief of ARDC Procurement, and accompanied Col. Fulton with Col. Busciato to present the material to Mr. Max Golden of Asst. Secretary Dudley Sharp's office, 23 January.

4. Mr. Golden had in his possession for reference a copy of the new [illegible] RWD-STL Contract number 1190, which contained the prohibition [illegible] no hardware for R-W on any of the BMD missiles or the ARS program, and requested clarification and amplification of the situation.

5. Col. Ohar's office forwarded to Col. Busciato, through BMD, a [illegible] letter discussing the Supplemental Agreement #12 to 1190, as well as [illegible] copy of the new effective letter contract - 165, which removes the [illegible] of R-W doing work against the ARS program. Since this material was forwarded to Washington 24 January, Col. Busciato, the DCS/D action officer has been out sick and hence, no action through that channel has transpired.

6. Mr. Golden, however, has made inquiries to General Putt and other procurement people, namely, B/G Davis, DCS/M Hq USAF, and B/G K. T. Thomson, Hq ARDC regarding this matter. He is particularly concerned since supplemental agreement to contract #1190 did not remove the ARS from the prohibition [illegible] 1957 [illegible]

7. At the moment we do not know what action, if any, is being taken by Mr. Golden and [illegible] people. Col. Ohar is very [illegible]

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[illegible] of their making a decision on inadequate information. In view [illegible] complexity of the [illegible] proposal, it is considered that [illegible] of this [illegible] to anyone else would be prejudicial to the best [illegible] of the WS 117L program and the Air Force.

SIGNED

Incl.
Memo (2 pp) (S)
4th 13 Jan. 58 w/D
WDTR 58-13

filed under
date

CHARLES H. TERHUNE, JR.
Colonel, USAF
Deputy Commander
Weapon Systems

127

WDTR 58-[illegible]

[redacted]

43

~~CONFIDENTIAL~~

[illegible] 18 February 1958

MEMORANDUM FOR GENERAL SCHRIEVER

SUBJECT: Preliminary Evaluation of ITEK Proposal

1. You asked me this morning to give you the subject evaluation by this evening. In order to meet your deadline, I am answering directly.

2. From a technical point of view the proposal appears feasible and in my opinion the feasibility study proposed by ITEK should be sponsored (their estimate is $[illegible],000) without delay.

3. The proposed camera subsystem shows great promise and should certainly be encouraged.

4. While the ITEK Camera proposal is particularly attractive I have some concerns about the rest of their proposal. Specifically:

a. I see no particular need to get AVCO to design and build a recovery package in addition to the proposed GE scheme. Aside from considerations of engineering and cost some weight might be attributed to General Anderson's interest in involving GE in the 117L program.

b. I'm not sure I understand the reason for proposing to separate the reconnaissance equipment from the rest of the orbital vehicle (including the last stage engine) until the film package is to be brought down. It would seem to me that we might have less orbital attitude stabilization problems if we stabilized the whole 117L vehicle. This also would require less additional engineering.

FREDERIC C. E. ODER
Colonel, USAF
Assistant for WS 117L

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[illegible]

WDTR

MEMORANDUM FOR COLONEL TERHUNE

FEB 14 1958

SUBJECT: R-W Participation in WS 117L

1. Reference your memorandum, same subject, 4 February 1958

2. As you know, we have been engaged in extensive justifications to Hq USAF with respect to the RADC award of the Subsystem "I" contract to R-W. The contract award was finally approved on the 7th of February by Mr. Golden at Hq USAF based upon R-W's participation in other aspects of WS 117L on a "on-call", "as requested" basis.

3. In view of AFBMD's justification on the "I" contract I feel it would be unethical and of questionable legality to extend the R-W participation in WS 117L to Systems Engineering Services.

4. Further, it should be realized that giving R-W "Systems Engineering" would require modification of the Lockheed contract. In view of our current problem at Lockheed this could well slow down the LMSD effort on an already difficult schedule.

5. None of the preceeding should imply that I am unaware of the fact that WS 117L has problems where R-W's help, properly established, would be most useful. I recently received from Dr. Mettler a draft paper on "Systems Problems in using 117L as Second Stage on Thor, Atlas, or Titan Boosters". While most helpful this paper does not point up problems that we have not already recognized and are taking action on.

6. This most recent exercise on increased R-W participation was predicated on a presently inadequate number of Air Force personnel assigned to WS 117L. In view of the President's decision to place WS 117L on a Nationally co-equal priority with the ICBM and IRBM programs, I strongly recommend that the WS 117L project office be manned to authorized strength immediately. With sufficient military engineering personnel on board to carry a close monitoring of contractor efforts, we would be able to identify problem areas which might then be placed with R-W under our current call contract in a timely and effective fashion.

FREDERIC C. E. ODER
Colonel, USAF
Assistant for WS 117L

[redacted]

44

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WDTR

19 FEB 1958

MEMORANDUM FOR COLONEL LEONHARD

SUBJECT: Air Technical Information Center (AFCIN-4) Requirements In Support of WS 117L

1. The Air Technical Information Center is responsible for the special processing of certain of the information expected from Subsystem F of WS 117L.

2. ATIC has informally expressed a requirement for FY 1958 MCP funds in the estimated amount of $300,000 to expand existing technical laboratory space to meet this requirement. They state the need for a two year lead-time to design, construct and equip this facility with a useful need date of early 1960. Therefore, FY 58 MCP funds will be required.

3. It is desired that you take the necessary actions to include these funds in the WS 117L FY 58 construction budget. ATIC will furnish such detailed description and justification as is required. Coordination of this requirement has been accomplished by AFCIN with SAC.

SIGNED

O. J. RITLAND
Brig General, USAF
Vice Commander

130

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WDTR 58-94

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45

WDTR

26 Feb 1958

MEMO TO/ General Ritland - WDGV

SUBJECT: Status of ARSTC Planning

WHAT AUTH. OR DOCUMENT?

1. The Strategic Air Command has been assigned as the Operating Command for WS 117L. Current SAC drafts of the Preliminary Ops Plan call for the ARSIC to be located at Hq SAC, Offutt Air Force Base, Nebraska. The Central Tracking and Data Acquisition Station will be co-located with the ARSIC.

Ref to memo Col Terhune 7 Jun 57 w/ para 2d

2. The agreement with SAC calls for ARDC to program for the facility and to equip the physical plant with the necessary WS 117L equipments. Form 161's have been submitted and $5,000,000.00 of MCP funds are programmed for 1st Quarter Fiscal 59.

3. RADC is negotiating a Prime Contract for the Data Processing Subsystem with R-W. Ramo-Wooldridge Corporation will be responsible for the development of necessary equipment and techniques for operation of the ARSIC.

4. The development of the ARSIC will progress in several phases. Initially it will take the form of a small interpretation center to interpret and evaluate the material returned from the series of early vehicles. Upon completion of the physical plant, the Center will be occuppied and will progress in sophistication to meet the ever increasing data output capability of the vehicles on orbit.

131

5. It is planned to man the Center with military personnel as soon as it is feasible to do so. Concurrent with the military operation of the Center, R & D will continue (at some location) on new equipments and techniques for phase in as required.

Charles H Terhune

CHARLES H. TERHUNE, JR.
Colonel, USAF
Deputy Commander
Weapon Systems

ARSIC - Advanced Reconnaissance Strategic Intelligence Center

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DISPOSITION FORM

46

[illegible]

DD [illegible] 96

AFMTC. LMSD representatives Mr. Gavalak and Mr. Hutchins are permanently assigned at AFMTC to work directly with the Douglas and Convair groups in monitoring and coordinating necessary changes. From every indication, Douglas and Convair have agreed on all points and can commence necessary work without further delay. Lt Colonel Heisler and his assistant Captain Roy, BMD WS 117L Liaison Office at AFMTC, did a commendable job in coordinating the various visiting groups and committees related to the 117L test effort.

Lockheed Facilities Requirements: ~~(SECRET)~~

LMSD submitted a facility brochure on 26 February reflecting land development, buildings, machine tools and test equipment estimated at $13,000,000. This schedule consolidates all of the 117L functions under one facility with some manufacturing assistance from the Van Nuys facility. This increase in floor space and equipment resulted from implementation of the acceleration of the 117L/107A-1 tests and augmentation of the Thor tests. Delivery or firing rate capabilities are not defined in this presentation.

James S. Seay
JAMES S. SEAY
Lt Colonel, USAF
Chief, WS 117L Branch
Deputy Director/Ballistic Missiles
Directorate/Procurement & Production

4

25 MAR 1958

WDIR

SUBJECT: Request for Technical Intelligence Read-out and Processing Support for WS 117L

TO:
Commander
Air Technical Intelligence Center
United States Air Force
Wright-Patterson Air Force Base, Ohio

1. Reference is made to your letter of 24 February 1958, subject as above.

2. Your requirement for a 12,000 sq. ft. addition to Building 259 at Wright-Patterson Air Force Base has been included in our Development Plan to support your responsibilities in the WS 117L program. This requirement has been identified as $300,000 of Military Construction (P-321) funds in FY 59.

3. It is requested that your headquarters prepare the appropriate Forms 161 which should be forwarded to this organization, attention: WDIR, as soon as possible. These will be submitted in turn to Headquarters USAF as a Supplement to the Development Plan constituting your justification for fund allocation purposes.

4. Design will be accomplished by the District Engineer in your area through your cognizant Air Force Installations Representative. Design authority will be issued by Headquarters USAF upon their approval of this project.

134

Copy furnished:
Hq USAF, Attn: AFOIE

SIGNED
O. J. RITLAND
Brig. Gen., USAF
Vice Commander

WDIR [illegible] mn
Col Hilton ([illegible]-2887)

[redacted] ~~CONFIDENTIAL~~

48

WEAPON SYSTEM 117L PROGRAM STATUS REPORT

As of 15 April 1958

RCS AF-XDD-A2

130

Prepared by
AIR FORCE BALLISTIC MISSILE DIVISION
HEADQUARTERS
AIR RESEARCH AND DEVELOPMENT COMMAND
United States Air Force
Post Office Box 262
Inglewood, California

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AIR FORCE BALLISTIC MISSILE DIVISION
HEADQUARTERS
AIR RESEARCH AND DEVELOPMENT COMMAND
United States Air Force
Post Office Box 262
Inglewood, California

WDPC

23 April 1958

WEAPON SYSTEM 117L PROGRAM STATUS REPORT
As of 15 April 1958
RCS AF-XDD-A2

FOREWORD

This is the first monthly status report for the Advanced Reconnaissance System, Weapon System 117L. The report covers the period from 15 March to 15 April 1958. The WS 117L Development Plan, submitted to Headquarters USAF in late March, was dated as of 15 March. Since the Development Plan contains the details of the ARS program, this report assumes general knowledge of the system on the part of all recipients.

Charles H Terhune Col USAF

for

B. A. SCHRIEVER
Major General, USAF
Commander

~~SECRET~~ ~~CONFIDENTIAL~~

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[redacted]

WEAPON SYSTEM 117L PROGRAM STATUS REPORT
As of 15 April 1958
RCS AF-XDD-A2

I. SUMMARY

The first flight test of the Air Force Air Reconnaissance System (ARS) vehicle will be conducted from Cooke Air Force Base, California in late 1958 with a THOR-boosted ARS vehicle.

The first flight test of an ATLAS-boosted ARS vehicle is scheduled for mid-1959 from the Air Force Missile Test Center (AFMTC), Florida. The first ATLAS-boosted flight from Cooke Air Force Base is tentatively scheduled for March 1960.

A captive test ARS vehicle, for use in the ATLAS-booster test program, is scheduled for completion in February 1959. It will undergo testing at the Lockheed Missile Systems Division test base at Santa Cruz, California. The test facility was completed during April.

A functional mockup of the airframe of the ARS vehicle is nearing completion at Lockheed Aircraft Corporation.

The Eagle Picher Company has been awarded a contract for supplying non-chargeable storage batteries for use with ARS THOR-boosted guided flights.

The Hoffman Company has been awarded a contract for development, fabrication, and testing of prototype photovoltaic solar arrays. The arrays will use solar energy to charge the storage batteries of the vehicle.

A light-weight, all-inertial guidance subsystem is being developed by the Massachusetts Institute of Technology. Present plans call for the first flight of the subsystem in early 1961.

Successful measurements of infrared radiation from an intercontinental ballistic missile were made during the flight of ATLAS missile 15A. The measurements were taken to determine how an ICBM appears to a satellite-borne infrared scanner during the power and altitude stages of the missile trajectory.

Five tracking and acquisition stations for data collection from ARS launchings will be required. These stations probably will be located in the vicinities of Cooke Air Force Base; Oxnard, California; Kaena Point, Hawaii; Anchorage, Alaska; and Sitka, Alaska.

Design modifications to launch complex 75-3 at Cooke Air Force Base are completed. This complex will be used for launching THOR-boosted vehicles. Siting and design of a launch complex for ARS ATLAS-boosted vehicles at AFMTC are in progress. Design criteria have been established for modifications of the ATLAS launch complex #14 service tower.

[redacted]

~~CONFIDENTIAL~~

Siting of the Cooke Air Force Base and Kaena Point, Hawaii, test tracking stations is complete. Siting of tracking and reconnaissance data acquisition stations in northeast, northwest, and central areas of the United States is in progress.

An intelligence interpretation and dissemination facility will be established at Headquarters, Strategic Air Command, Offutt Air Force Base, to serve as the program control center, data collection center, and training center.

A facility to house equipment for the analysis of technical information will be constructed at Wright-Patterson Air Force Base, Ohio, for use by March 1960.

A teletype from Headquarters USAF requested a revision of the Financial Annex (Section III) of the ARS Development Plan, dated 15 March 1958, from 214 million to 152 million dollars. It also requested that the program remain flexible. Major revisions of program objectives will have to be made if a reduction of this magnitude takes place in the fund program.

138

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[redacted]

II. TEST PROGRAM STATUS

A. FLIGHT TESTS

1. Both ATLAS and THOR missiles will be used in support of the Air Force Advanced Reconnaissance System (ARS) program. THOR-boosted ARS vehicles will be primarily for engineering tests of the orbital capability of the vehicle. Early ATLAS-boosted ARS vehicles will also be used for engineering purposes but, unlike the THOR-boosted vehicles, will contain developmental reconnaissance equipment. These latter vehicles will evolve into the operationally configured ARS.

2. The first THOR-boosted ARS vehicle is scheduled for completion in June 1958 and will be launched from Cooke Air Force Base, California in late 1958. Following this initial flight, one THOR-boosted flight per month is tentatively scheduled through August 1959. X

3. The first ATLAS-boosted flight test of the ARS is scheduled for mid-1959 from the Air Force Missile Test Center (AFMTC), Florida. The launchings of subsequent ATLAS-boosted flights will be transferred to Cooke Air Force Base. The first ATLAS-boosted flight from Cooke is tentatively scheduled for March 1960.

B. CAPTIVE TESTS

1. A captive test ARS vehicle for use in the ATLAS-booster test program is scheduled for completion in February 1959. This vehicle will be used for testing at the Lockheed captive test facility at Santa Cruz, California.

2. THOR-boosted ARS engineering vehicles will not require captive testing.

III. SUBSYSTEMS

A. AIRFRAME (Lockheed - System Prime Contractor)

A functional mockup of the airframe of the advanced reconnaissance vehicle is nearing completion at the prime contractor's plant. Wind tunnel models of the ARS vehicle and the ATLAS booster are shown in Figure 1. Figures 2 and 3 are model representations of the ARS vehicle.

B. PROPULSION (Bell Aircraft Corporation - Sub-Contractor to Lockheed)

Development has been started on an improved engine for the ARS vehicle. The fuel will be changed from JP-4 to unsymmetrical di-methyl hydrazine (UMDH). This higher energy fuel will permit larger payloads in the ARS vehicle. The point at which this engine will be available for the ARS flight test schedule has not yet been determined. The new fuel will probably not be used until after the first few ARS flights have been made. √

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[redacted]

C. AUXILIARY POWER

1. Contracts related to the auxiliary power subsystem for the ARS vehicle have been awarded to the Eagle Picher Company and the Hoffman Company. The Eagle Picher Company will supply non-chargeable storage batteries for use with THOR-boosted, guided flights. The Hoffman contract is for development, fabrication, and testing of prototype photovoltaic solar arrays. These arrays will provide solar energy to charge storage batteries used to power various vehicle components.

2. Negotiations are underway with Engineered Magnetics Company for a supply of ARS vehicle inverters and voltage regulators to be used on THOR-boosted flights. Modifications have been made to similar components for use on ATLAS-boosted flights.

D. GUIDANCE

A light-weight all-inertial guidance subsystem is being developed by the Massachusetts Institute of Technology to guide the ARS vehicle into orbit and to stabilize its position with reference to the earth while in orbit. Plans call for the first test flight of the subsystem using at ATLAS booster in early 1961.

E. INFRARED

The first successful measurements of infrared radiation from intercontinental ballistic missiles were made from a B-47 during the flight of ATLAS missile 15A. These measurements were the first in a series to determine what an ICBM would look like to a satellite borne infrared scanner during the power and altitude stages of the missile trajectory. This subsystem is being designed to give early warning of an enemy ICBM attack as well as other data. A mockup of the infrared reconnaissance scanner is shown in Figure 4.

F. GROUND-SPACE COMMUNICATIONS (Philco Corporation - Sub-Contractor to Lockheed)

1. The requirements for tracking and acquisition sites necessary for obtaining data from the THOR-boosted ARS vehicle launchings from Cooke Air Force Base have been established. A total of five tracking and acquisition stations will be required. One station will be provided at Cooke, and a down-range tracking station probably will be located in the vicinity of Oxnard, California. Of the remaining three stations, one will be in Hawaii and two in Alaska. One Alaska station will be located in the Anchorage area; the other will be in the Sitka area.

2. Radio frequency allocations have been requested for data transmission for the THOR and ATLAS-boosted ARS programs.

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[redacted]

141

IV. FACILITIES

A. INDUSTRIAL

1. During April, construction of the test base of the Lockheed Missile System Division at Santa Cruz, California was completed. Installation of the test instrumentation in the components test laboratory at this base was also completed during the month. The first tests on the ARS propulsion system components have been conducted at the test facility. The status of the construction underway at this facility as of 18 March is shown in Figure 5.

2. The foundations of the static test stands and blockhouse for the ARS program at Santa Cruz have been poured. Installation of the test stand superstructure and instrumentation has begun. Construction contracts have been rescheduled to permit hot firings on the test stand by 15 June 1958. The status of the test stand and blockhouse construction as of 18 March is shown in Figure 6.

B. MILITARY CONSTRUCTION PROGRAM

1. Design criteria modifications to launch complex 75-3, Sites 4 and 5, at Cooke Air Force Base have been established. This complex will be used for launching THOR-boosted ARS test vehicles. The complex will consist of two launch stands, one blockhouse, and one missile support center. This facility is now under construction. The foundation for the blockhouse has been poured, and the support center is being designed. Construction and instrumentation of the launcher are scheduled for completion by October 1958 in preparation for an ARS launching in late 1958.

2. Siting and design of an ATLAS-boosted ARS launch complex in the Cooke Air Force Base area is in progress. A site in the south Cooke Air Force Base area has been found that will satisfy the site criteria. Headquarters USAF has been requested to obtain approval of the site in this tri-service controlled area. Criteria for the launch complex will be completed in 25 April, and the design will be completed in October. The complex will consist of two launch stands, one blockhouse, and one missile support center. It is anticipated that construction of the complex will be completed by October 1959 in preparation for an ARS launching in March 1960.

3. The design criteria for the modification of the service tower on the ATLAS launch complex #14 at AFMTC are ready. This complex will be modified during fiscal year 1959 by Convair and Lockheed for use in the ARS program in June 1959.

4. Siting of test tracking stations for the ARS program at Cooke Air Force Base and Kaena Point on the Island of Oahu, Hawaii, have been completed. The construction of an access road to the Kaena Point site is in progress. A tracking, control, and telemetry station will be built at each of these two locations. At each station, a portion has been designed for use during the first year of operation. Construction of these portions will start in May 1958. These interim facilities will consist of one 60-foot

diameter TLM-18 telemetry antenna and receiver building, a tracking radar, and associated structures. The interim facilities will be needed by 1 November 1958. The complete station will have, in addition to the interim facility, one 60-foot diameter ultra high frequency (UHF) telemetry antenna and receiver building (Cooke only), an administration and data processing building (Cooke only), a 10-foot diameter angle tracker, a 6-foot diameter vehicle command transmitting antenna, and associated structures. The complete facilities will be needed by October 1959.

5. Van-mounted tracking and transmitting facilities will be provided for use in Alaska by 1 November 1958.

6. Siting of ARS tracking and reconnaissance data acquisition stations in the northeast, northwest, and central areas of the United States is in progress. The criteria for the intercept, control, and data acquisition stations for each of these three locations will be completed in June 1958, and the design will be started in June and July. The sites will be selected in May and June. Each of these stations will consist of one VHF and two UHF telemetry antennas 60 feet in diameter, three telemetry receiver buildings, a 10-foot diameter angle tracker, a 6-foot diameter vehicle command transmitter, interstation communications buildings, and associated structures. The facilities in the northeast and northwest areas will be needed by March 1960, and the station in the Central United States will be needed in January 1961.

7. An intelligence interpretation and dissemination facility will be located at Headquarters, Strategic Air Command, Offutt Air Force Base. This facility will serve as the program control center, as collection center for all reconnaissance data obtained from the data acquisition stations, and as the training center. Criteria for the facility are being developed, and design will begin in June 1958. Construction is scheduled to start in December 1958, and the facility will be ready for use by the time it is needed in March 1960.

8. A facility to house laboratory equipment and instrumentation for the analysis of technical information will be built at Wright-Patterson Air Force Base. The criteria have been developed. The facility will be needed by March 1960.

V. GENERAL STATUS

A. FUNDS

The status of funds in appended separately as is the practice with the monthly AIR FORCE BALLISTIC MISSILES PROGRAM STATUS REPORT.

B. OTHER SIGNIFICANT ITEMS OF INTEREST

A teletype received from Headquarters USAF requested a revision of the Financial Annex (Section III) of the Advanced Reconnaissance

System Development Plan, dated 15 March 1958. This request represents a downward revision of the financial plan from 214 million to 152 million dollars. The teletype requested that the program remain flexible. However, reduction of this magnitude in the fund program will result in the elimination of specific and important reconnaissance capabilities, a delay in achievement of operational status, and a decided increase in the risk aspects of the program without any reduction in the eventual cost of the overall program.

[redacted] CONFIDENTIAL

49

WEAPON SYSTEM 117L PROGRAM STATUS REPORT

As of 15 May 1958

RCS AF-XDD-A2

Prepared by
AIR FORCE BALLISTIC MISSILE DIVISION
HEADQUARTERS
AIR RESEARCH AND DEVELOPMENT COMMAND
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United States Air Force
Post Office Box 262
Inglewood, California

WDPC

23 May 1958

WEAPON SYSTEM 117L PROGRAM STATUS REPORT
As of 15 May 1958
RCS AF-XDD-A2

FOREWORD

This is the second of the monthly Weapon System 117L Program Status Reports which were established by Headquarters USAF TWX, AFDRD-EX 58935, dated 2 April 1958.

O J Ritland B/Gen.
for

B. A. SCHRIEVER
Major General, USAF
Commander

[redacted]

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WEAPON SYSTEM 117L PROGRAM STATUS REPORT
As of 15 May 1958
RCS AF-XDD-A2

I. SUMMARY

Work on the first THOR-boosted Advanced Reconnaissance System (ARS) vehicle is on schedule. System installation design is proceeding satisfactorily.

A breadboard model of the visual reconnaissance subsystem for the ARS program was demonstrated at Eastman Kodak Laboratories on 24 April.

Because B-47 aircraft are being used to obtain measurements of infrared (IR) radiation from ICBMs, the emergency grounding of all B-47 type aircraft has temporarily halted the Infrared Measurements program.

A contract with the Ramo-Wooldridge Corporation provides for design and implementation of the intelligence data handling system for the ARS. Subcontracts have been negotiated with ITEK Corporation, Broadview Research Corporation, Systems Laboratories Corporation, and Planning Research Corporation. A project and program control procedure has been established.

Construction drawings and specifications for the interim tracking and telemetry stations at Cooke Air Force Base, California and at Kaena Point, Hawaii were released for construction. The stations are scheduled for completion 1 September.

Construction of launch stands and blockhouses for the THOR-booster complex in the south Cooke area is on schedule.

Fort Stevens, Oregon has been recommended for the site of the northwest United States tracking and data acquisition station. A final selection for the northeast United States station is scheduled for the week of 9 June. Locations for a central site are being reviewed.

The Preliminary Operations Plan for the ARS was published in April and forwarded to Headquarters USAF for approval.

A newly formed Air Force Bioastronautics Division at Inglewood, California, will function as a consultant and liaison group for all ARS biomedical activity. This Division worked with Lockheed to prepare a work statement covering production of five biosatellite recovery capsules. The capsules will permit the launch, orbit, and recovery of animal subjects. The first launch of four mice is programmed for January 1959.

II. TEST PROGRAM STATUS

FLIGHT TESTS

Work on the first THOR-boosted Advanced Reconnaissance System (ARS) vehicle continued on schedule. The vehicle is scheduled for completion in June. Although no major milestones in the flight test program were scheduled for this reporting period, system installation design milestones were successfully achieved. See Figures 1 through 4.

III. SUBSYSTEMS

A. AIRFRAME (Lockheed - System Prime Contractor)

1. Four segmented steel tanks were completed. These tanks will be used as back-up for the aluminum tanks which are planned for flight test use. Three tanks failed when subjected to pressure tests. The fourth tank was modified and successfully passed pressure tests but is slightly heavier than the desired weight.

2. A welding machine for assembling spun aluminum tanks was received, and training in its use is underway. Efforts are being made to reduce the number of manufacturing processes involved in producing the aluminum tanks. One result of these efforts is the elimination of the chem-mill process.

3. Problems previously encountered in the welding of magnesium thorium alloys used for structure and skin are being eliminated as experience is gained. The elimination of these problems removes one of the possible delaying factors in the flight schedule.

4. An early test on the helium regulator used for pressurizing propellant tanks indicated a technical problem area. However, tests on a second helium regulator produced by Robert Shaw Fulton Company were satisfactory. Failure on the early test was attributed to faulty test procedure and metal chips found in the regulator assembly.

B. VISUAL RECONNAISSANCE

The breadboard model of the visual reconnaissance subsystem for the ARS program was demonstrated at Eastman Kodak Laboratories on 24 April. Included were airborne equipment and equipment for recording data at the ground station. The airborne portion consisted of the camera, the processor, and the readout scanning mechanism operating in series. The ground portion was a separate unit with a complete readout device scanning simulated photography which was displayed on the ground reconstruction device.

C. INFRARED

Because B-47 aircraft are being used to obtain measurements of infrared (IR) radiation from ICBMs, the emergency grounding of all B-47

[redacted]

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VII. GENERAL STATUS

A. STATUS OF FUNDS

Appended separately.

B. OTHER SIGNIFICANT ITEMS OF INTEREST

1. Formation of an Air Force Bioastronautics Division at Inglewood, California, was directed on 23 April. The Bioastronautics Division will function as a subsystem consultant and liaison group for all biomedical activity in ARS. In conjunction with Lockheed, Bioastronautics Division prepared a work statement dated 14 May which will result in a contract to produce five Biosatellite Recovery Capsules (BRC) for ARS vehicles. These BRC will permit the launch, orbit, and recovery of animal subjects. The animals will suffer no irreversible biological damage. Collection of biological and environmental data such as temperature, humidity, pressures, acceleration, cosmic radiation, weightlessness, psychological responses, etc., will be assured. Mice, rats, and small primates will be used. The first launch of four mice is programmed for January 1959.

2. During May the Qualitative Personnel Requirements Information (QPRI) program for ARS progressed satisfactorily. A list of assumptions were formulated, approved, and forwarded to LMSD for inclusion in a QPRI report due on 30 June. The draft QPRI report will be completed by 30 May. Coordination, review, and approval of the document for publication will be accomplished during the first week in June. This report will be time-phased for an operational date of early 1961 for the Pioneer visual and Pioneer Ferret subsystems. The Northeast and Northwest operational tracking and acquisition stations will be operated by military personnel by 1961.

type aircraft has halted the Infrared Measurements program until 28 May. The program will measure radiation from all ICBMs to be launched at the Air Force Missile Test Center. Additional detailed information is being acquired from a similar measurement program which has already produced very successful results. These results indicate that IR radiation from ICBMs may be much greater than previously estimated. Data from one ATLAS flight and one VANGUARD flight indicated that sensing equipment was saturated with IR radiation at a range of 600 miles.

D. INTELLIGENCE DATA HANDLING

A contract with the Ramo-Wooldridge Corporation provides for the design and implementation of the intelligence data handling system for the advanced reconnaissance satellite. Major subcontracts were negotiated by R-W in this period with ITEK Corporation for the major optical assemblies and devices; Broadview Research Corporation for photo interpretation keys and equipment requirements; Systems Laboratories Corporation for geodetic calculations and applications; and Planning Research Corporation for application of their intelligence parameter work. A mutually agreeable working relationship with Lockheed has been achieved to insure the coordination of effort and the timely and orderly exchange of information required for the most expeditious development of the total system. To fulfill the Air Force responsibility of overall management control of these two parts of the system, a project and program control procedure identical to the one established for the ballistic missiles programs is being followed.

IV. FACILITIES

MILITARY CONSTRUCTION PROGRAM

1. Construction drawings and specifications for the interim tracking and telemetry station at Cooke Air Force Base have been completed and released for construction. Bid opening is scheduled for 27 May. Construction will be completed by 15 August and equipment will be installed by 1 November. Design of the complete station has been initiated and is scheduled for completion by 1 September.

2. Construction of launch stands and blockhouses for the THOR booster launch complex at Cooke Air Force Base is progressing on schedule. Modification of existing buildings for an interim missile assembly facility will begin early in June.

3. Discussions with the Navy indicate that a firm decision on the site for an ATLAS booster launch complex in the south Cooke area is expected within a week. Design and preparation of construction drawings for the launch complex, including a missile assembly building, will begin in June.

4. Construction drawings and specifications have been completed and released for construction of the interim tracking and data acquisition station at Kaena Point on the island of Oahu, Hawaii. Bids were opened on

9 May, and a construction contract was awarded during the week of 12 May. Beneficial occupancy date is 15 August, and installation of equipment will begin at that time. The need date is 1 November. Design of the complete station has been started and will be completed by 1 September. Construction of the access road has been completed.

5. The site survey team recommended Fort Stevens, Oregon for the site of the northwest United States tracking and data acquisition station. Approval for use of this site is being requested from Headquarters USAF.

X

6. Electronic survey crews are investigating sites proposed for the northeast United States tracking and data acquisition station. It is expected that the site survey team will recommend a final northeast site by 31 May. The final site selection is scheduled for the week of 9 June.

7. A meeting was held with the Corps of Engineers and the Air Force Installation Representative at Omaha, Nebraska to consider the location of a central site. A list of thirteen suggested sites is being reviewed. Five sites will be selected for site studies. The initial studies are scheduled for the last week in May.

V. PRODUCTION STATUS

The first ARS vehicle is scheduled for shop completion late in June. The present plan for manufacture and checkout provides for component fabrication at Lockheed (LMSD), Van Nuys, California; vehicle assembly at LMSD, Sunnyvale, California; subsystem installation, modification and checkout at LMSD, Palo Alto, California; engine firing and system checkout at LMSD, Santa Cruz, California; and final checkout at Cooke Air Force Base and the Air Force Missile Test Center.

VI. OPERATIONAL CAPABILITY STATUS

A. OPERATIONAL PLANNING

1. The Preliminary Operational Plan for the ARS was published in April and forwarded to Headquarters USAF for approval.

2. An ARS Weapon Phasing Group charter was published.

B. OPERATIONAL SITES AND FACILITIES

The south Cooke Air Force Base area was selected as the optimum location for conducting ARS launches. An agreement between the Navy and the Air Force provided for the Air Force to make soil borings for the ARS complex in the south Cooke area if the borings would not interfere with either present or projected Navy plans for that area. Action was taken immediately to have the architect-engineer proceed with the soil borings.

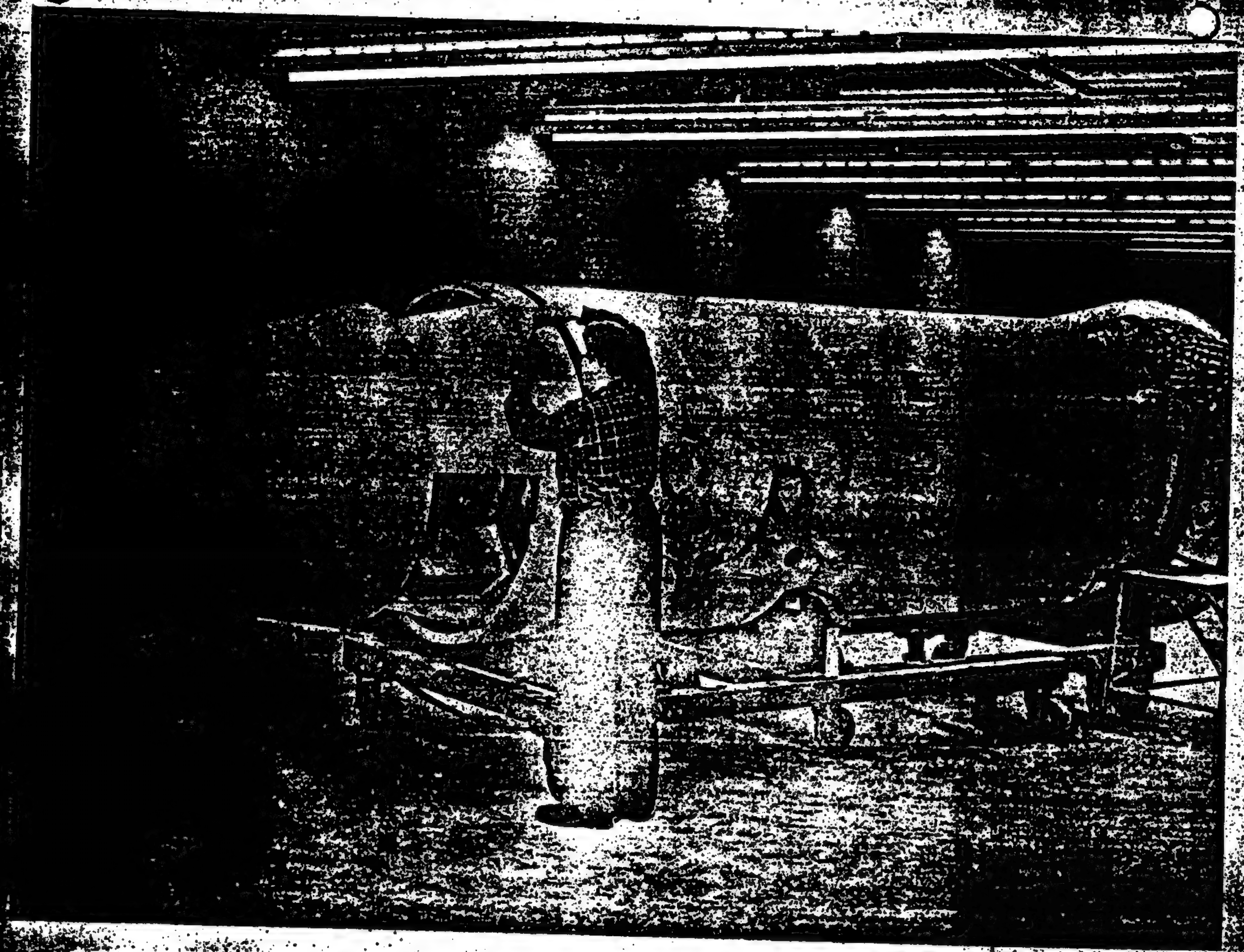

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Figure 1. Full scale functional mockup of WS-117L vehicle and ATLAS adapter.

(WDPC-58-15)

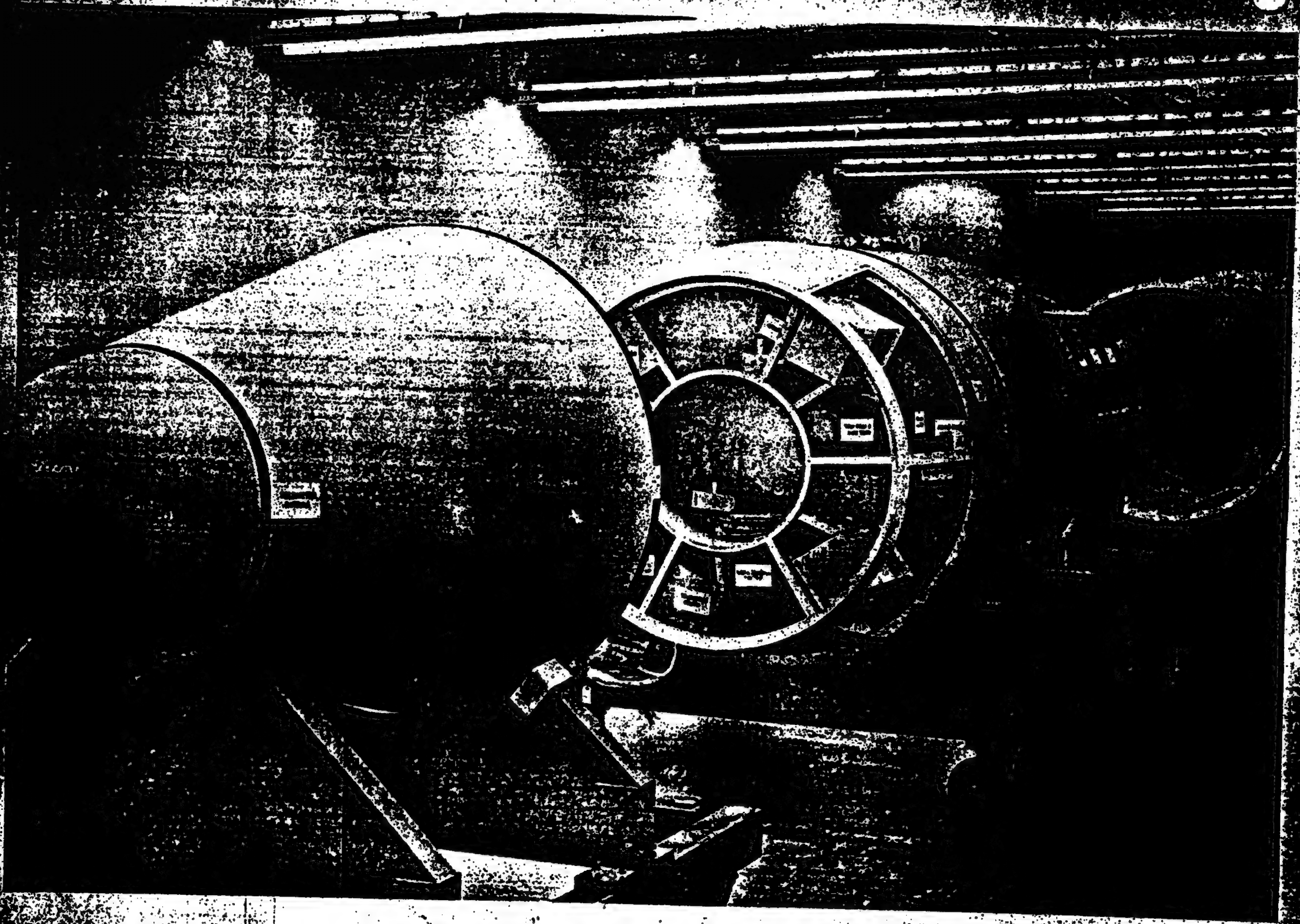

Figure.2. Exploded view of the WS-117L vehicle mockup and ATLAS adapter showing from front to rear: (A) Nose cone with detachable nose cap (B) Midbody with forward and aft equipment racks (C) ATLAS adapter section (D) Un-installed, spherically nested fuel and acid tanks for the vehicle.

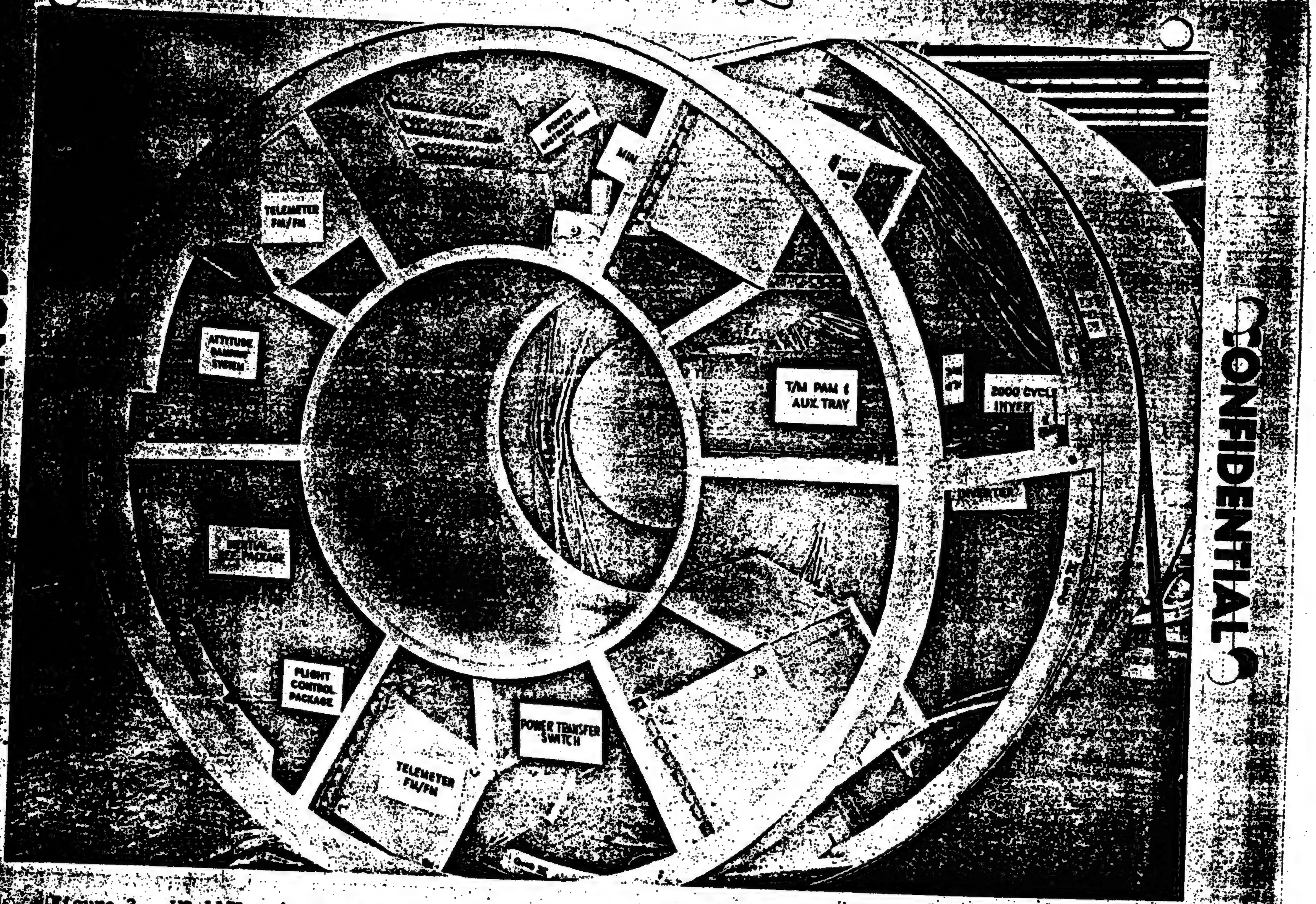

Figure 3. WS-117L vehicle functional mockup, midbody forward equipment rack with partial equipment installed.

(WDPC-58-15)

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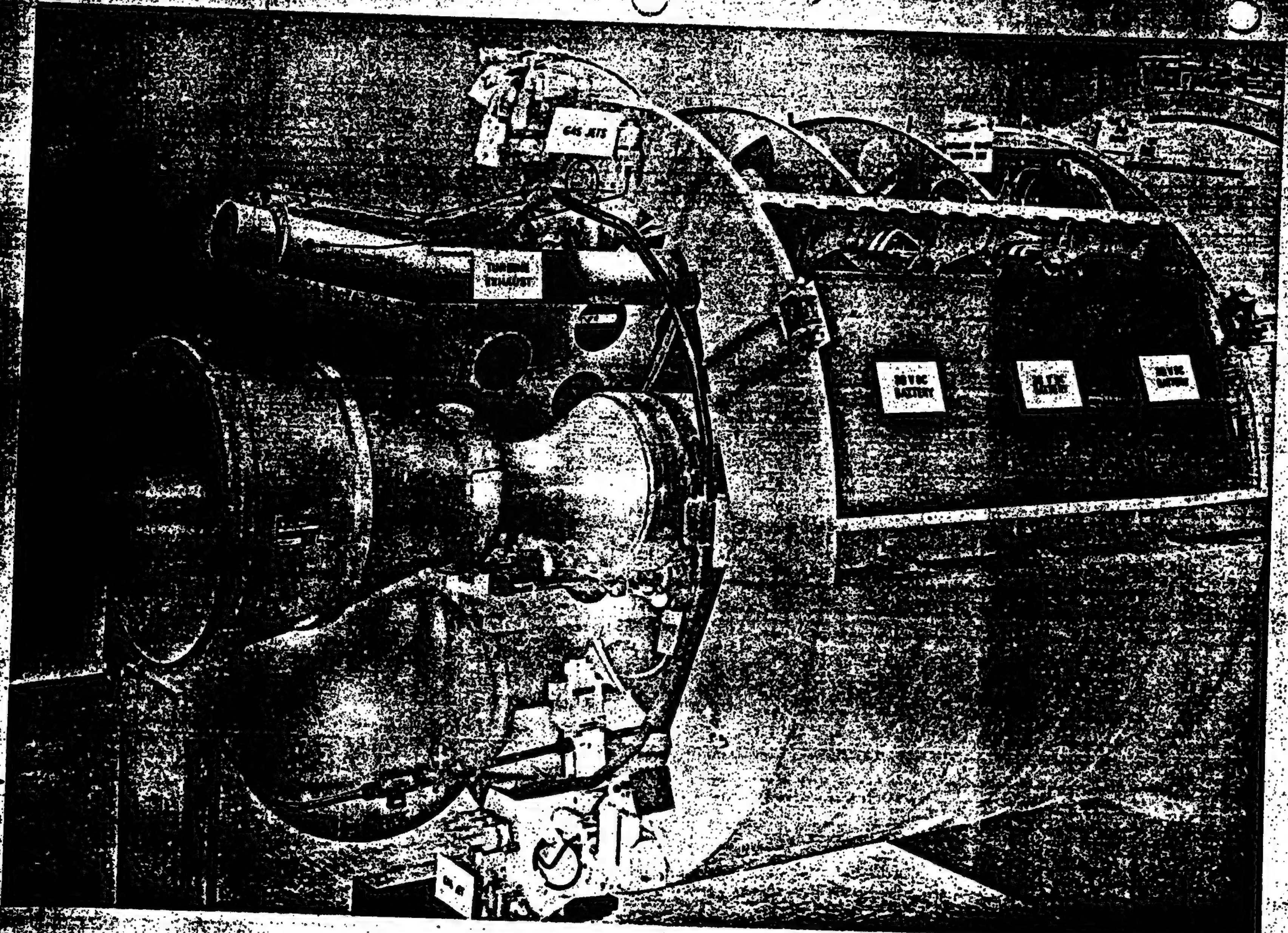

Figure 4. WS-117L vehicle functional mockup, aft equipment rack which surrounds the vehicle engine installation.

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[illegible]

APR 30 1958

MEMORANDUM FOR GENERAL [illegible]

SUBJECT: Status of Advanced Reconnaissance Systems Intelligence Center Planning

1. [illegible] of 14 February 1958 [illegible] field survey [illegible] and Data Acquisition stations will go into the field on or about 1 May 1958, under the cognizance of [illegible]. It probably will not be co-located with the ARSIC, if the ARSIC is located at Omaha due to space and electronic interference requirements.

2. The Site Selection Board, chairmanned by Colonel [illegible], agreed to accept the suggestion of the SAC member on the Board, Colonel [illegible], that the ARSIC would be assumed to be located at Omaha for planning the Tracking and Data Acquisition Site Survey Team's work in the field. Technical criteria and space requirements for the ARSIC have not been generated as yet for the Site Selection Board's consideration.

SIGNED

CHARLES H. TERHUNE, JR.,
Colonel, USAF
Deputy Commander
Technical Operations

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INTERVALS; NOT AUTOMATICALLY
DECLASSIFIED. DOD DIR 5200.10

[redacted]

adv-51
File
WS117L

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WEAPON SYSTEM 117L PROGRAM STATUS REPORT

For Period 15 April to 31 May 1958

RCS AF-XDD-A2

Prepared by
AIR FORCE BALLISTIC MISSILE DIVISION
HEADQUARTERS
AIR RESEARCH AND DEVELOPMENT COMMAND
United States Air Force
Post Office Box 262
Inglewood, California

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Copy 29 of 50

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[redacted]

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AIR FORCE BALLISTIC MISSILE DIVISION
HEADQUARTERS
AIR RESEARCH AND DEVELOPMENT COMMAND
United States Air Force
Post Office Box 262
Inglewood, California

WDPC

10 June 1958

WEAPON SYSTEM 117L PROGRAM STATUS REPORT
For Period 15 April to 31 May 1958
RCS AF-XDD-A2

FOREWORD

This is the second of the monthly Weapon System 117L Program Status Reports which were established by Headquarters USAF TWX, AFDRD-EX 58935, dated 2 April 1958.

The Advanced Reconnaissance System vehicle has recently been renamed the "Sentry".

Permission was granted in May to change the as of date of this report from the 15th of each month to the end of each month. This date is more compatible with the reporting system established for the Weapon System 117L program.

O. J. Ritland, B/GEN.
~~B. A. SCHRIEVER~~
~~Major General, USAF~~
~~Commander~~

~~CONFIDENTIAL~~

[redacted]

~~CONFIDENTIAL~~

WEAPON SYSTEM 117L PROGRAM STATUS REPORT
For Period 15 April to 31 May 1958
RCS AF-XDD-A2

I. SUMMARY

Work on the first THOR-boosted Advanced Reconnaissance System (ARS) vehicle is on schedule. System installation design is proceeding satisfactorily.

A breadboard model of the visual reconnaissance subsystem for the ARS program was demonstrated at Eastman Kodak Laboratories on 24 April.

Because B-47 aircraft are being used to obtain measurements of infrared (IR) radiation from ICBMs, the emergency grounding of all B-47 type aircraft has temporarily halted the Infrared Measurements program.

A contract with the Ramo-Wooldridge Corporation provides for design and implementation of the intelligence data handling system for the ARS. Subcontracts have been negotiated with ITEK Corporation, Broadview Research Corporation, Systems Laboratories Corporation, and Planning Research Corporation. A project and program control procedure has been established.

Construction drawings and specifications for the interim tracking and telemetry stations at Cooke Air Force Base, California and at Kaena Point, Hawaii were released for construction. The stations are scheduled for completion 1 September.

Construction of launch stands and blockhouses for the THOR-booster complex in the South Cooke area is on schedule.

Fort Stevens, Oregon was approved as the site of the northwest United States tracking and data acquisition station. A final selection for the northeast United States station is scheduled for the week of 9 June. Locations for a central site are being reviewed.

The Preliminary Operations Plan for the ARS was published in April and will be forwarded to Headquarters USAF for approval.

A newly formed Air Force Bioastronautics Division at Inglewood, California, will function as a consultant and liaison group for all ARS biomedical activity. This Division worked with Lockheed to prepare a work statement covering productions of five biosatellite recovery capsules. The capsules will permit the launch, orbit, and recovery of animal subjects. The first launch of four mice is programmed for January 1959.

II. TEST PROGRAM STATUS

FLIGHT TESTS

Work on the first THOR-boosted Advanced Reconnaissance System (ARS) vehicle continued on schedule. The vehicle is scheduled for completion in June. Although no major milestones in the flight test program were scheduled for this reporting period, system installation design milestones were successfully achieved. See Figures 1 through 4.

III. SUBSYSTEMS

A. AIRFRAME (Lockheed - System Prime Contractor)

1. Four segmented steel tanks were completed. These tanks will be used as back-up for the aluminum tanks which are planned for flight test use. Three tanks failed when subjected to pressure tests. The fourth tank was modified and successfully passed pressure tests but is slightly heavier than the desired weight.

2. With the cooperation of the Sandia Centrifuge Section, inertial loading tests were performed on the first spun aluminum flight tank and one segmented steel tank. Both passed the tests successfully. The aluminum tank, completed on 24 May, was pressure tested to 85 psi and then flown to Sandia. The cooperation of the Atomic Energy Commission and Sandia on these tests was exceptional.

3. A welding machine for assembling spun aluminum tanks was received, and training in its use is underway. Efforts are being made to reduce the number of manufacturing processes involved in producing the aluminum tanks. One result of these efforts is the elimination of the chem-mill process.

4. Problems previously encountered in the welding of magnesium thorium alloys used for structure and skin are being eliminated as experience is gained. The elimination of these problems removes one of the possible delaying factors in the flight schedule.

5. An early test on the helium regulator used for pressurizing propellant tanks indicated a technical problem area. However, tests on a second helium regulator produced by Robert Shaw Fulton Company were satisfactory. Failure on the early test was attributed to faulty test procedure and metal chips found in the regulator assembly.

6. It has been determined that a single helium boom extension would assure proper vehicle aerodynamic stabilization at the lower orbital altitudes assumed for early Program IIA flights. Redesign work is in progress. However, engineering effort to increase the functional reliability of the twin-boom extension mechanism is continuing. Program IIA flights will be THOR-boosted for early orbital capability.

7. Small vanes, or fins, are being added to the aft end of the ARS vehicle for vertical stabilization. The additions will permit better alignment of the center of pressure and the center of the gravity in the vehicle.

B. **AUXILIARY POWER**

In addition to battery power, the use of solar power for the tracking beacons is being considered for Program 11A flights. Design effort is being coordinated with temperature, efficiency, and power requirement studies to determine how the solar power collectors can be incorporated into the Program 11A flight vehicles as soon as possible.

C. **VISUAL RECONNAISSANCE**

The breadboard model of the visual reconnaissance subsystem for the ARS program was demonstrated at Eastman Kodak Laboratories on 24 April. Included were airborne equipment and equipment for recording data at the ground station. The airborne portion consisted of the camera, the processor, and the readout scanning mechanism operating in series. The ground portion was a separate unit with a complete readout device scanning simulated photography which was displayed on the ground reconstruction device.

D. **INFRARED**

Because B-47 aircraft are being used to obtain measurements of infrared (IR) radiation from ICBMs, the emergency grounding of all B-47 type aircraft has halted the Infrared Measurements program through May.. The program will measure radiation from all ICBMs to be launched at the Air Force Missile Test Center. Additional detailed information is being acquired from a similar measurement program which has already produced very successful results. These results indicate that IR radiation from ICBMs may be much greater than previously estimated. Data from one ATLAS flight and one VANGUARD flight indicated that sensing equipment was saturated with IR radiation at a range of 600 miles.

E. **INTELLIGENCE DATA HANDLING**

A contract with the Ramo-Wooldridge Corporation provides for the design and implementation of the intelligence data handling system for the advanced reconnaissance satellite. Major subcontracts were negotiated by R-W in this period with ITEK Corporation for the major optical assemblies and devices; Broadview Research Corporation for photo interpretation keys and equipment requirements; Systems Laboratories Corporation for geodetic calculations and applications; and Planning Research Corporation for application of their intelligence parameter work. A mutually agreeable working relationship with Lockheed has been achieved to insure the coordination of effort and the timely and orderly exchange of information required for the most expeditious development of the total system. To fulfill the Air Force responsibility of overall management control of these two parts of the system, a project and program control procedure identical to the one established for the ballistic missiles programs is being followed.

IV. FACILITIES

MILITARY CONSTRUCTION PROGRAM

1. Construction drawings and specifications for the interim tracking and telemetry station at Cooke Air Force Base have been completed and released for construction. Construction will be completed by 15 August and equipment will be installed by 1 November. Design of the complete station has been initiated and is scheduled for completion by 1 September.

2. Design criteria for the ARS intelligence center at Offutt Air Force Base are scheduled to be completed and available for review by 15 June.

3. Construction of launch stands and blockhouses for the THOR booster launch complex at Cooke Air Force Base is progressing on schedule. Modification of existing buildings for an interim missile assembly facility will begin early in June.

4. Air Staff approval was obtained to site two launchers and a blockhouse for the ARS program in the south Cooke Air Force Base area. Since the Air Staff approval stated that the siting must conform to the Navy master plan, the proposed site location was forwarded through Navy channels for further Navy approval. Local Navy authorities at Point Mugu agreed to site the facility as presented by the Air Force. Launch facility design criteria review is scheduled for the first week in June.

5. Construction drawings and specifications have been completed and released for construction of the interim tracking and data acquisition station at Kaena Point on the island of Oahu, Hawaii. Bids were opened on 9 May, and a construction contract was awarded during the week of 12 May. Beneficial occupancy date is 15 August, and installation of equipment will begin at that time. The need date is 1 November. Design of the complete station has been started and will be completed by 1 September. Construction of the access road has been completed.

6. The site survey team recommended Fort Stevens, Oregon, for the site of the northwest United States tracking and data acquisition station. Electronic surveys of the site indicate that it is satisfactory for ARS operations. Because this site was the first priority choice of the Site Selection Board, it was decided to obtain Board approval by message instead of convening the Board. All Board members approved the location for the northwest station at Fort Stevens. After finalization, recommendations will be submitted to Headquarters USAF for approval.

7. Electronic surveys of proposed locations for the northeast United States tracking and data acquisition site were completed on 31 May. The Site Selection Board will meet on 9 June to make the final decision on the site.

8. A meeting was held with the Corps of Engineers and the Air Force Installation Representative at Omaha, Nebraska, to consider the location of a central United States tracking and data acquisition site. The site selection team started survey activities on 26 May. The Selection Board will meet on 9 June to select central locations for electronic surveys. It is tentatively planned to convene the Site Selection Board on 15 July to make a final decision on the central site location.

9. Review of plans and specifications and award of construction contract for the interim test tracking station at Annette Island, Alaska, will be accomplished during June. Completion is scheduled for mid August.

10. An existing aircraft control and warning station at Cape Chiniak, Kodiak Island, Alaska, is to be occupied as an interim test tracking station. This arrangement will eliminate the need for construction of any new facilities.

V. PRODUCTION STATUS

The first ARS vehicle is scheduled for shop completion late in June. The present plan for manufacture and checkout provides for component fabrication at Lockheed (LMSD), Van Nuys, California; vehicle assembly at LMSD, Sunnyvale, California; subsystem installation, modification and checkout at LMSD, Palo Alto, California; engine firing and system checkout at LMSD, Santa Cruz, California; and final checkout at Cooke Air Force Base and the Air Force Missile Test Center.

VI. OPERATIONAL CAPABILITY STATUS

A. OPERATIONAL PLANNING

1. The Preliminary Operational Plan for the ARS was published in April and will be forwarded to Headquarters USAF for approval.

2. An ARS Weapon Phasing Group charter was published.

3. The first meeting of the ARS Weapon System Phasing Group was held 21 and 22 May. Briefings were presented on the background and status of the system, the various subsystems, and the content of the ARS Preliminary Operational Plan. A Communications and Electronics Subcommittee was established. The Subcommittee was specifically directed to investigate problems concerning frequency allocations to the ARS program and system requirements that dictate the extreme bandwidth in the ground point-to-point communication system. The Communications and Electronics Subcommittee will also investigate any communication and electronic problem which could have bearing on the ARS program.

B. OPERATIONAL SITES AND FACILITIES

The south Cooke Air Force Base area was selected as the optimum location for conducting ARS launches. An agreement between the Navy and the Air Force provided for the Air Force to make soil borings for the ARS complex in the south Cooke area if the borings would not interfere with either present or projected Navy plans for that area. Action was taken immediately to have the architect-engineer proceed with the soil borings.

VII. GENERAL STATUS

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Appended separately.

B. OTHER SIGNIFICANT ITEMS OF INTEREST

1. Formation of an Air Force Bioastronautics Division at Inglewood, California, was directed on 23 April. The Bioastronautics Division will function as a subsystem consultant and liaison group for all biomedical activity in ARS. In conjunction with Lockheed, Bioastronautics Division prepared a work statement dated 14 May which will result in a contract to produce five Biosatellite Recovery Capsules (BRC) for ARS vehicles. These BRC will permit the launch, orbit, and recovery of animal subjects. The animals will suffer no irreversible biological damage. Collection of biological and environmental data such as temperature, humidity, pressures, acceleration, cosmic radiation, weightlessness, psychological responses, etc., will be assured. Mice, rats, and small primates will be used. The first launch of four mice is programmed for January 1959.

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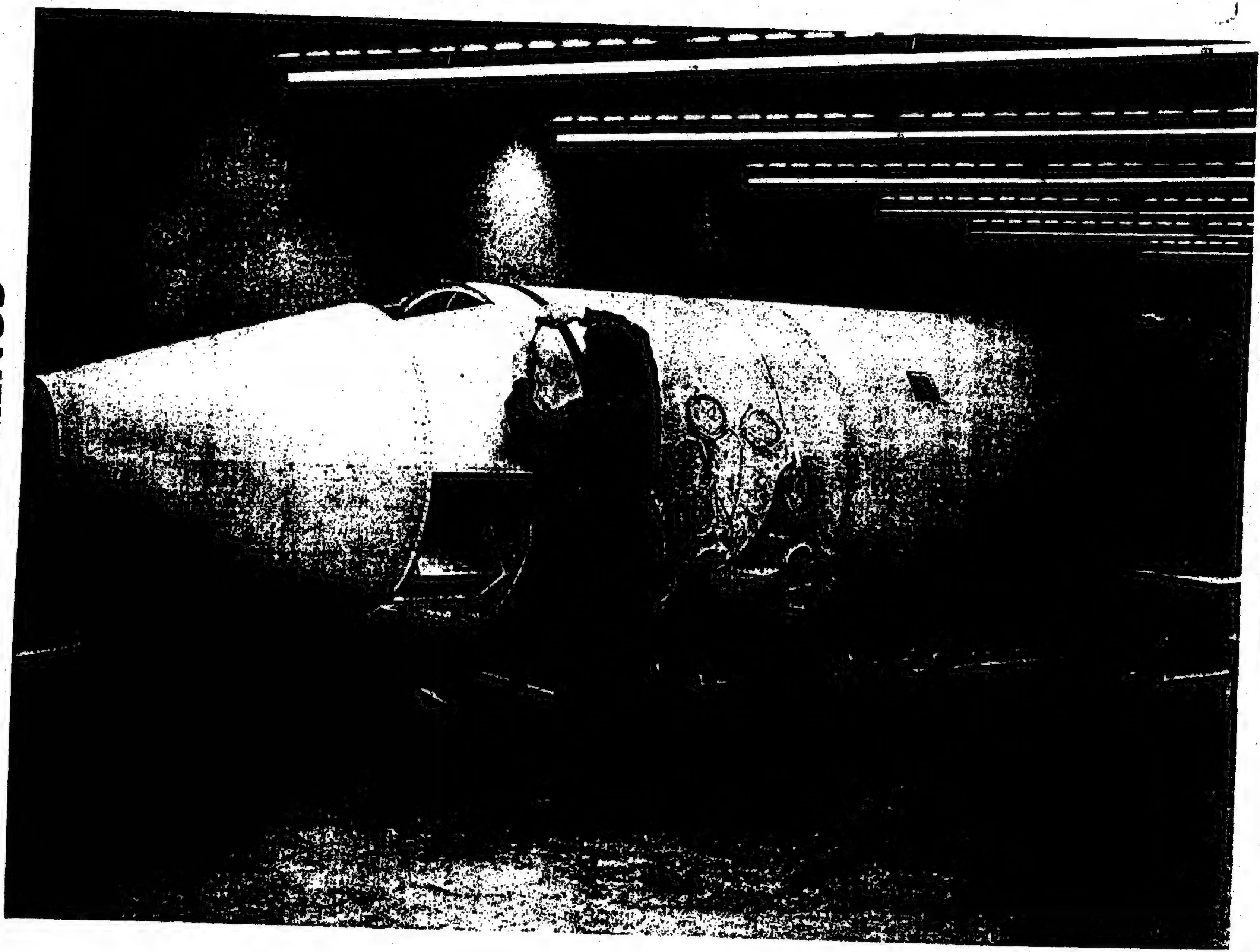

Figure 1. Full scale functional mockup of WS-117L vehicle and ATLAS adapter.

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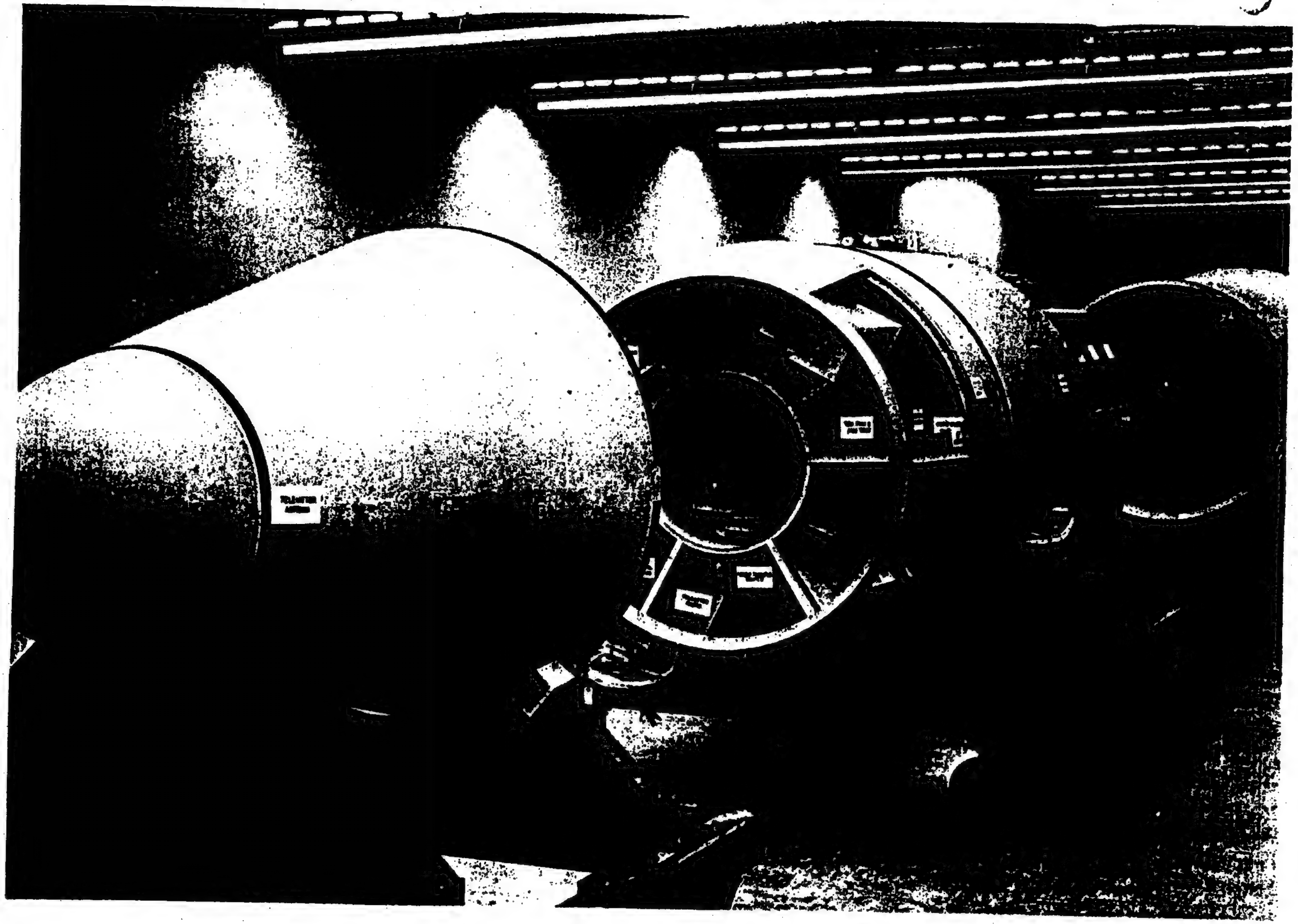

Figure 2. Exploded view of the WS-117L vehicle mockup and ATLAS adapter showing from front to rear: (A) Nose cone with detachable nose cap (B) Midbody with forward and aft equipment racks (C) ATLAS adapter section (D) Un-installed, spherically nested fuel and acid tanks for the vehicle.

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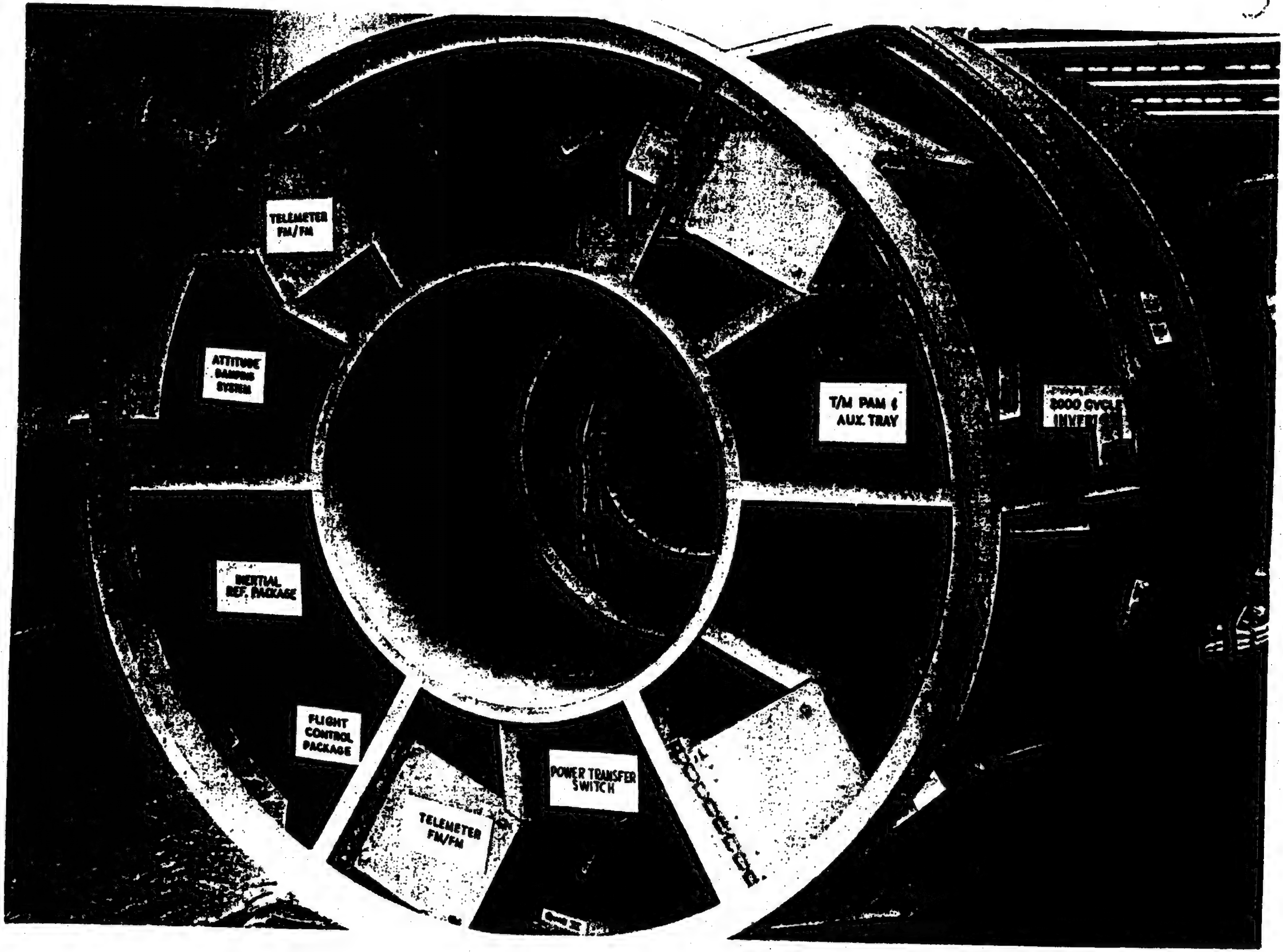

Figure 3. WS-117L vehicle functional mockup, midbody forward equipment rack with partial equipment installed.

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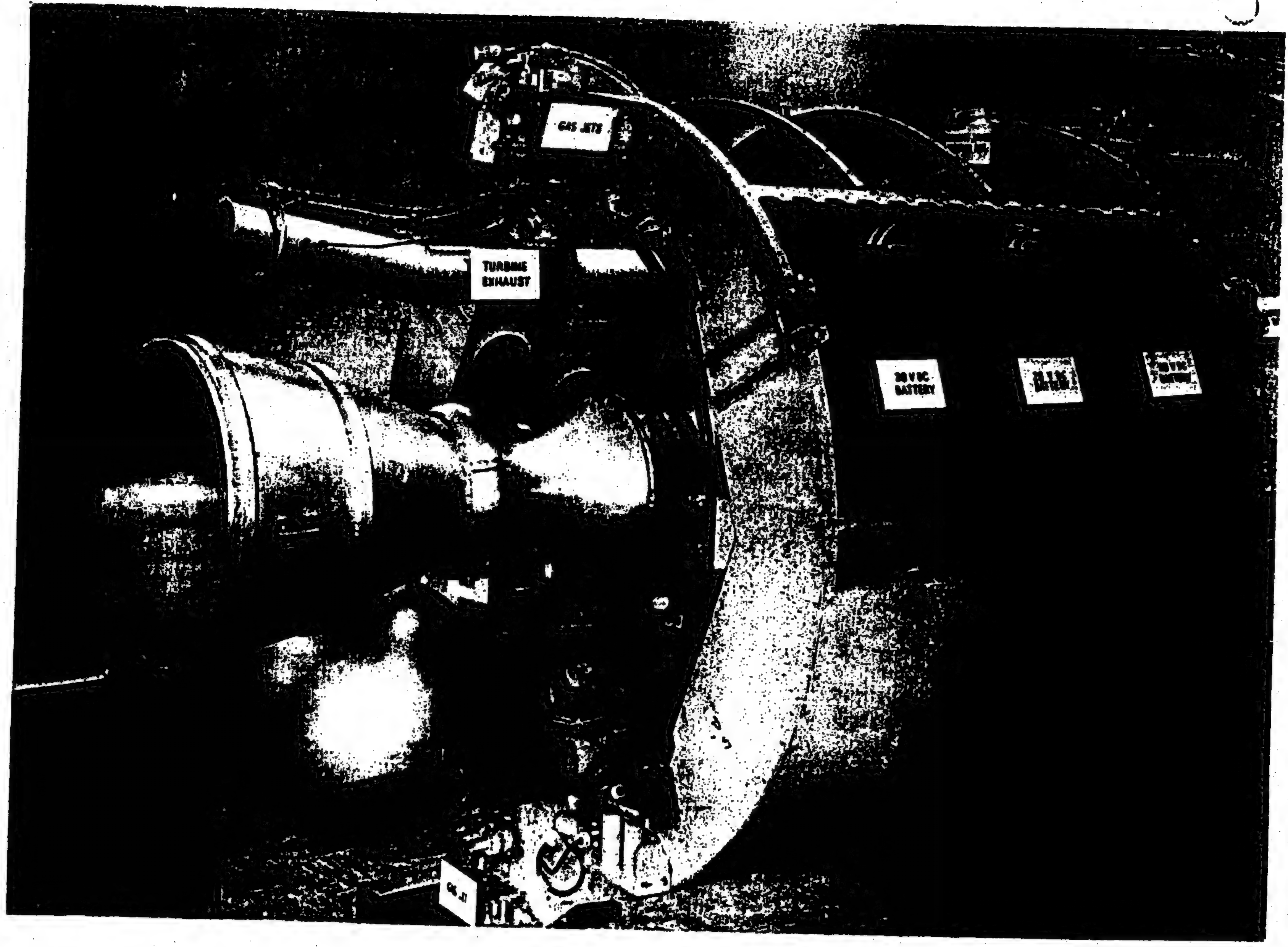

Figure 4. WS-117L vehicle functional mockup, aft equipment rack which surrounds the vehicle engine installation.

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INFO FOR: AFOIE - COL MCCARTY - AFOOP-OC-R - MAJOR BROWN

INFO FOR: CINCSAC - D/I - COL SMITH

THE WS 117L SITE SELECTION BOARD IN A MEETING AT AFBMD ON 9 JUNE 58 CONSIDERED THE PROBLEM OF SITING THE INTELLIGENCE CENTER FOR WS 117L. THIS FACILITY IS REFERRED TO ON PAGES IV - 27 AND IV - 27 AND IV - 28 OF THE 15 MARCH 1958 AFBMD ADVANCED RECONNAISSANCE SYSTEM (WS 117L) DEVELOPMENT PLAN. IN THE PROPOSED SAC WS 117L PRELIMINARY OPERATIONAL PLAN SACOP 5-58, APRIL 1958 THIS SAME FACILITY IS PROPOSED TO BE LOCATED AT OFFUTT AFB NEBRASKA (REFERENCE PAR 14F (3) ON PAGE 24). IN ORDER THAT THE DEVELOPMENT PLAN SCHEDULE BE MAINTAINED THIS/FACILITY MUST BE STARTED IN DESIGN VERY SOON, ACCORDINGLY, ITS SITING MUST BE ACCOMPLISHED WITHOUT DELAY. REQUEST DECISION ON OFFUTT LOCATION OF THIS FACILITY AS PROPOSED IN SACOP 5-58 BE EXPEDITED.

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JUNE 58

DOWNGRADED AT 12 YEAR
INTERVALS; NOT AUTOMATICALLY
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WDTSR

SIGNED

F. C. E. ODER, COLONEL, USAF

FREDERIC C. E. ODER
Colonel, USAF
Director for WS 117L

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WDTSR

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53

26 June 1958

MEMORANDUM FOR COLONEL SHEPPARD, WDGO

SUBJECT: Operating Agency for WS 117L

I. For the following reasons, it is important that the WS 117L operating agency be identified as soon as possible.

a. User inputs of operational criteria are needed as a basis for design of technical facilities. Immediate examples are the WS 117L launchers and data acquisition station at Cooke.

b. The using agency should act for the Air Force in securing rights for joint use of Tongue Point with the Coast Guard.

c. Designation of the operating agency will determine the participation and hence the influence in site selection of the Central U.S. Data Acquisition Station and the Intelligence Center.

171

W. E. Leonhard

WILLIAM E. LEONHARD
Colonel, USAF
Deputy Commander, Installations

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172

WEAPON SYSTEM 117L PROGRAM STATUS REPORT

For Quarter Ending 30 June 1958

RCS AF-XDD-A2

DOWNGRADED AT 12 YEAR INTERVALS; NOT AUTOMATICALLY DECLASSIFIED. DOD DIR 5200.10

Prepared by
AIR FORCE BALLISTIC MISSILE DIVISION
HEADQUARTERS
AIR RESEARCH AND DEVELOPMENT COMMAND
United States Air Force
Post Office Box 262
Inglewood, California

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AIR FORCE BALLISTIC MISSILE DIVISION
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United States Air Force
Post Office Box 262
Inglewood, California

WDPC

8 July 1958

WEAPON SYSTEM 117L PROGRAM STATUS REPORT
Quarter Ending 30 June 1958
RCS AF-XDB-A2

FOREWORD

2

This report summarizes the progress made in the Advanced Reconnaissance System program during the period 1 April through 30 June 1958.

O. J. Ritland, B/GEN.
for
B. A. SCHRIEVER
Major General, USAF
Commander

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174

WEAPON SYSTEM 117L PROGRAM STATUS REPORT
For Quarter Ending 30 June 1958
RCS AF-XDD-A2

I. BRIEF OF PROGRESS

Development of the THOR-boosted advanced reconnaissance system (ARS) vehicle scheduled for launch from Cooke Air Force Base late in 1958 was on schedule. System installation design milestones were achieved.

Reprogramming directives for THOR-boosted flights placed emphasis as a secondary objective upon collection of geophysical research data and development testing of a recoverable biosatellite capsule. The primary objective of flight testing the ARS vehicle and the ground-space communication network was unchanged. To obtain the new secondary objectives, the ARS vehicle was redesigned for lighter weight. A decision to change the fuel used for the main engines of the ARS vehicle to an unsymmetrical di-methyl hydrazine/inhibited red fuming nitric acid combination (UDMH/IRFNA), a higher energy fuel, permitted planning for use of larger payloads in the ARS vehicle. It is planned to phase in the UDMH engine in the #5 flight test vehicle.

objectives
primary
secondary

Twenty-two significant propulsion test assembly cold flow tests were performed at the Santa Cruz Test Base of the Lockheed Missile Systems Division. Design of the auxiliary power subsystem for the first ARS flight was completed and drawings were released. Detailed integration designs were started for installation of subsystems for nuclear auxiliary power units into the ARS vehicle.

A breadboard model of the visual reconnaissance subsystem for the ARS program was demonstrated at the Eastman Kodak Laboratories on 24 April. Significant progress was made on both the interim Pioneer and the Pioneer Ferret equipment programs. A program to provide infrared radiation measurements was undertaken. High-altitude balloon flights to obtain infrared power ground measurements in the 2.7 micron region were successfully completed.

A contract was awarded to provide for design and implementation of the intelligence data handling subsystem for the ARS.

[redacted] ~~CONFIDENTIAL~~

175 — all release

WEAPON SYSTEM 117L PROGRAM STATUS REPORT
For Quarter Ending 30 June 1958
RCS AF-XDD-A2

II. TOPICAL SUMMARY

A. GENERAL

1. Both ATLAS and THOR missiles will be used in support of the Advanced Reconnaissance System (ARS) program. THOR-boosted ARS vehicles will be used in the early phase of the program primarily for engineering tests of the orbital capability of the vehicle. Early ATLAS-boosted ARS vehicles will also be used for engineering purposes but, unlike the THOR-boosted vehicles, will contain developmental reconnaissance equipment. The ATLAS-boosted vehicles will evolve into the operationally configured ARS.

2. Work on the first THOR-boosted ARS vehicle continued generally on schedule throughout this quarterly reporting period, and system installation design milestones were successfully achieved. This vehicle, due for completion in June, will be completed early in July. It will be launched from Cooke Air Force Base late in 1958. Following this initial flight, one THOR-boosted flight per month is tentatively scheduled through August 1959.

3. The first ATLAS-boosted flight test of the ARS is scheduled for June 1959 from the Air Force Missile Test Center (AFMTC), Florida. After initial launchings from AFMTC, subsequent ATLAS-boosted flights will be transferred to Cooke Air Force Base. The first ATLAS-boosted flight from Cooke is tentatively scheduled for March 1960.

4. A captive test ARS vehicle for use in the ATLAS-booster test program is scheduled for completion in February 1959. This vehicle will be used for testing at the Lockheed captive test facilities, Santa Cruz, California.

5. Instructions issued in March redirected the secondary objective of THOR-boosted ARS flights. The secondary objective of these flights, which comprise the early Program IIA phase of the overall ARS program, originally emphasized Pioneer Visual reconnaissance. The new directives shifted the emphasis as a secondary objective from a visual reconnaissance application employing a recoverable film capsule to the collection of geophysical research data ~~and the development testing of a~~ recoverable biosatellite capsule. Flight testing of the ARS basic vehicle system and the ground-space communication network remained the primary objective of the redirected program. Ten launches have been scheduled for this program. The first flight is planned for November 1958. All launches will be made from Cooke Air Force Base, with the objectives of achieving a Polar orbit at 160 to 225 statute miles altitude, depending on payload and mission objective.

[redacted] ~~CONFIDENTIAL~~

6. Formation of an Air Force Bioastronautics Division at Inglewood, California, was directed on 23 April. The Bioastronautics Division will function as a subsystem consultant and liaison group for all biomedical activity in the ARS program. In conjunction with Lockheed, Bioastronautics Division prepared a work statement dated 14 May which will result in a contract to produce five biosatellite recovery capsules for ARS vehicles. These recovery capsules will permit the launch, orbit, and recovery of animal subjects. The animals will suffer no irreversible biological damage. Collection of biological and environmental data such as temperature, humidity, pressures, acceleration, cosmic radiation, weightlessness, psychological responses, etc., is planned. Mice, rats, and small primates will be used. The first launch of four mice is programmed for January 1959.

176

Rec 7. Two types of biosatellite payloads are contemplated for ARS flight tests; a recovery capsule to demonstrate the feasibility of the system by returning a living animal from orbit to earth, and a recovery capsule which will return a sub-human primate from orbit. Only environmental data will be collected in the early type capsule. Physiological data are also desired from the sub-human primate capsule.

Rec 8. All five of the contemplated biosatellite flights will be launched south from Cooke Air Force Base. With the ground stations planned for the primary flight objectives of the program, it would be impractical to recover anywhere except over the Pacific Ocean. It is planned that all biosatellites will make eighteen orbits with approximately a ninety-minute period prior to recovery. Re-entry trajectories will be initiated over Alaska, and recovery after re-entry will take place in the vicinity of Hawaii.

Rec 9. Studies have been conducted to establish the feasibility of "drag only" re-entry trajectory using ablation techniques to protect the basic structure and contents. Preliminary calculations have shown that this method is feasible for re-entry. After re-entry is completed, the capsule should decelerate to its subsonic terminal velocity at about 50,000 feet altitude. Below this altitude a reefed parachute will be used to accomplish further decelerations with low shock loadings, and touchdown on earth will be at about 20 feet per second.

Rec 10. Studies were initiated to determine the relative advantages of aerial, sea, or land recovery of biosatellites. Currently, indications favor aerial recovery at approximately 10,000 feet altitude by using a system already fully developed for the C-119. Over 1500 successful recoveries with the C-119 system indicate its serviceability for this application. To pinpoint the descending parachute capsule, silvering of the chute, ejection of chaff charges from the capsule, and a capsule Sarah beacon can be employed in conjunction with radar aircraft (RC-121 equipped with APS-20 search radars and Sarah beacon receivers).

III see remark

11. A study of system reliability has been underway. The system reliability analysis includes reliability models for the system and for each of the subsystems. Reliability allocations have been calculated for each of the subsystems. This information is being prepared for distribution in a technical report. A malfunction reporting procedure has been formulated and is being reviewed.

12. The first meeting of the ARS Weapon System Phasing Group was held in May. Briefings were presented on the background and status of the over-all system, the various subsystems, and the content of the ARS preliminary Operational Plan. A Communications and Electronics Subcommittee was established. This subcommittee was directed to investigate problems concerning frequency allocations to the ARS program, system requirements dictating the extreme bandwidth in the ground point-to-point communication system, and any communication and electronic problem which could have bearing upon the ARS program.

13. The engineering analysis report for the Program III Pioneer Reconnaissance satellite has been completed and will be published by the Lockheed Aircraft Corporation as a formal engineering report.

B. SATELLITE AIRFRAME

1. To obtain Program IIA objectives of geophysical and biomedical research data, the ARS vehicle was redesigned for lighter weight. ARS vehicle and THOR-interface problems (such as booster payload capabilities, allowable loadings, separation dynamics, guidance and control) were mainly resolved. Extensive performance studies were conducted and nominal trajectories were calculated. Small scale (1/15) wind tunnel tests were completed with an ARS/THOR configuration and design for a substantial balance of the instrumentation required for the IIA program was accomplished.

2. Design of a facility checkout vehicle, formerly identified as propulsion test vehicle assembly #3, was completed. Structural design was completed for flight test vehicles numbers five through ten, and installation design is well underway.

3. A decision to change the fuel used for the main engines of the ARS vehicle from JP4/IRFNA to UDMH, a higher energy fuel, permits use of larger payloads in the ARS vehicle.

4. The decision to change to UDMH fuel early in Program IIA flights necessitated some redesign of the vehicle and propellant tanks, in addition to changes in the rocket engine itself. Changes include a lengthened and modified forward mid-body for the vehicle; and a redesigned conical shell, connected fuel and oxidizer tanks, and rearrangement of plumbing for the propellant tanks. Design effort was initiated for a recoverable capsule under development by the General Electric Company. ✓

Capsule

It has been determined that a single helium boom extension would insure proper vehicle aerodynamic stabilization at the lower orbital altitudes assumed for early Program IIA flights. However, engineering effort continued on the twin-boom extension mechanism for the purpose of increasing the functional reliability of this mechanism. Small vanes or fins are being added to the aft of the vehicle for vertical stabilization. These additions will permit better alignment of the vehicle's center of pressure and center of gravity.

5. Problems previously encountered in the welding of magnesium thorium alloys used for structure and skin are being eliminated as experience is gained. The elimination of these problems removes one of the possible delaying factors in the flight schedule.

6. Four segmented steel tanks were completed, and will be used as back-up for the aluminum tanks planned for flight test use. Three of these tanks failed when subjected to pressure tests. The fourth was modified and successfully passed pressure tests, but is slightly heavier than the desired weight.

178

7. With the cooperation of the Sandia Centrifuge Section, inertial loading tests were performed on the first spun aluminum flight tank and one segmented steel tank. Both passed the tests successfully. The aluminum tank, completed on 24 May, was pressure tested to 85 psi and then flown to Sandia. Exceptional cooperation was received from the Atomic Energy Commission and Sandia on these tests.

8. A welding machine for assembling spun aluminum tanks was received by Lockheed, and training in its use is underway. Efforts are being made to reduce the number of manufacturing processes involved in producing the aluminum tanks. One result of these efforts is the elimination of the chem-mill process.

9. An early test on the helium regulator used for pressurizing propellant tanks indicated a technical problem area. However, tests on a second helium regulator produced by Robert-Shaw Fulton Company were satisfactory. Failure on the early test was attributed to faulty test procedure and metal chips found in the regulator assembly.

10. Despite the introduction of accelerated schedules and changes in Program IIA objectives from recovery of visual reconnaissance to the geophysical and biomedical programs, the airframe subsystem maintained satisfactory design progress on Program I throughout the quarterly reporting period. An exploded view of the ARS vehicle mockup and the ATLAS adapter is shown in Figure 1.

C. SATELLITE PROPULSION SYSTEM

1. The two ARS rocket engines delivered by Bell Aircraft during the first quarter of 1958 were assigned to the Santa Cruz Test Base of the Lockheed Missile Systems Division. The first ground test engine was mounted

in the newly completed propulsion test assembly. The entire propulsion system (composed of prototype components, except for boiler plate tanks) underwent hot firing tests. The second engine was assigned for installation in propulsion test vehicle assembly #1. Three hot firings were conducted on the prototype system. The first firing was cut off by the ground safety equipment because of gas generator flame-out due to faulty installation procedures. The second was successful and was shut down, by command, after seven seconds. Engine performance was satisfactory. A third hot-firing of 12 seconds duration also was successful. However, pump inlet pressures were greater than specified, and the cause is being investigated. Analysis of data from these firings is still in progress. Preliminary results indicate that objectives were obtained. The gimbal-mounted engine is shown in Figure 2. The static firing test stands and the instrumentation blockhouse at the Santa Cruz Test Base are shown in Figure 3.

179 dle remove

2. Twenty-two significant propulsion test assembly (PTA) cold-flow tests were performed to date at the Santa Cruz Test Base. Testing revealed no difficulty with suction pressure during the starting transients. It was found that helium line pressure drops were higher than the calculated design figure and additional test instrumentation was installed to determine the cause of this discrepancy.

3. To increase satellite-vehicle rocket-engine performance, an unsymmetrical di-methyl hydrazine/inhibited red fuming nitric acid (UDMH/IRFNA) propellant combination will be introduced early in the flight test program to replace the JP-4/IRFNA combination planned for use in the initial THOR-boosted ARS flights. The first UDMH engine, a modified JP-4 engine, has been tested. A satisfactory run of 17 seconds has been completed.

D. __AUXILIARY POWER SUBSYSTEM__

1. The design of the auxiliary power subsystem (APS) for the first ARS flight vehicle has been completed and all drawings have been released. An analysis of the electrical load requirements has been completed. Because of the number of battery units to be carried in Flight 1, the severly limited total life of the APS is estimated at 20 hours. The total Flight 1 battery capacity is limited to two silver peroxide zinc batteries (Type II) for a total weight of 52 pounds. The total installed auxiliary power subsystem weight for Flight 1 is 124 pounds.

2. Detailed integration designs were started for the installation of both SNAP I and SNAP II (subsystems for nuclear auxiliary power) into the ARS vehicle. Design sketches of the equipment beam were forwarded to subcontractors for coordination of the initial installation concept of the auxiliary power unit equipment. Detailed shield designs for both the SNAP I and SNAP II auxiliary power units also were initiated in connection with this detailed integration program. Development of ground-support equipment requirements and start procedures for the SNAP I program continued.

3. Negotiations were underway with Engineered Magnetics Company for a supply of ARS vehicle inverters and voltage regulators to be used on THOR-boosted flights. Modifications have been made to similar components for use on ATLAS-boosted flights.

4. In addition to battery power, the use of solar power for the tracking beacons is being considered for Program IIA flights. Design effort is being coordinated with temperature, efficiency, and power requirement studies to determine how the solar power collectors can be incorporated into the Program IIA flight vehicles as soon as possible.

E. SATELLITE GUIDANCE AND CONTROL SYSTEM

180

1. A procurement plan for the production of a light-weight all-inertial guidance system for the ARS vehicle has been completed. The guidance system is being developed by the Massachusetts Institute of Technology to guide the ARS vehicle into orbit and to stabilize its position with reference to the earth while in orbit. The plan calls for the first test flight of the production system using an ATLAS booster early in 1961.

attitude control

2. Arrangements have been completed to provide the initial units of the essential guidance and control hardware for the ARS/THOR combination. The equipment will include both the planned and the back-up inertial reference package.

F. SATELLITE RECONNAISSANCE DEVICES

VISUAL RECONNAISSANCE

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1. Activity in the interim visual reconnaissance program, the original objective of Program IIA, was terminated.

2. A significant milestone was met with the successful demonstration, on schedule, of the breadboard model of the Pioneer Visual reconnaissance subsystem at the Eastman Kodak Company. The model included airborne equipment and equipment for recording data at the ground station. The airborne portion consisted of the camera, the processor, and the read-out scanning mechanism operating in series. The ground portion was a separate unit with a complete readout device scanning simulated photography which was displayed on the ground reconstruction device.

3. The experimental model of the 36-inch focal length lens and collimator for testing were delivered in May to the Eastman Kodak Company. This lens is planned for the advanced visual program. Preliminary tests indicate that design requirements of 100 lines/mm resolution have been met.

4. The visual reconnaissance payload mockup is illustrated in Figure 4.

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ELECTRONIC RECONNAISSANCE

1. During June, the Soviet radar catalogue was revised to include the latest inputs from the intelligence community. A study on Soviet block telemetry was completed. The study incorporates a tabulation of currently available characteristics of Soviet telemetry systems.

2. Significant progress was made by the Airborne Instruments Laboratory, the electronic reconnaissance subsystem contractor, on both the interim Pioneer and Pioneer Ferret equipment programs. Major subassemblies were designed and design criteria on the interim Pioneer subsystem were completed.

INFRARED RECONNAISSANCE

1. The first successful measurements of infrared radiation from intercontinental ballistic missiles were made from B-47 aircraft during the flight of ATLAS 15A. These measurements were the first in a series to determine how an ICBM appears to a satellite-borne infrared scanner during the power and altitude stages of the missile trajectory. The infrared scanning system is being designed to give early warning of an enemy ICBM attack as well as other data.

2. Efforts to obtain infrared radiation measurements, halted temporarily by the emergency grounding of all B-47 aircraft, were resumed late in June. The program provides for measuring radiation from all ICBMs to be launched at the Air Force Missile Test Center. Additional detailed information is being acquired from a similar measurement program which has already produced very successful results. This information indicates that infrared radiation from ICBMs may be much greater than previously estimated. Data from one ATLAS flight and one VANGUARD flight indicated that sensing equipment was saturated with infrared radiation at a range of 600 miles.

3. The series of high-altitude balloon flights planned for obtaining infrared-power ground measurements in the 2.7 micron region has been successfully completed, and a final report has been submitted. Preparations are underway for making additional flights to take measurements in the 3 to 5 micron regions of the spectrum. The infrared detector in these measurements will be the Eastman Kodak lead-selenide cell, cooled to dry-ice temperature. In carrying out the comprehensive program of evaluating all possible detectors for use in the ARS infrared subsystem, measurements have been completed on 12 unimmersed lead sulphide cells supplied by Electronic Corporation of America and 12 lead sulphide cells supplied by Infrared Industries Incorporated.

G. COMMUNICATIONS SYSTEM

1. Development of ground-space communications progressed throughout this quarterly reporting period. Preliminary tests were completed on the S-band beacon and a preliminary communication plan for Program IIA was drawn up. Design for orbit antennas to be used for

telemetry and beacon in a vehicle with nose-down attitude were completed. Exit antennas were reduced in weight and voltage breakdown tests were conducted on different antennas.

2. Modifications of the SCR MOD II radars progressed rapidly. The sequence programmer breadboard for Program II, the Pioneer Visual reconnaissance program, was completed and preliminary testing was started. A slippage of approximately six weeks resulted from changes in the command telemetry ranging system; however, no difficulty is anticipated in getting back on schedule. Ground command equipment is rapidly approaching the pre-prototype stage. Satisfactory progress continues in the area of the wide band data link. A pre-prototype ground UHF receiver has been completed and tested. The use of printed circuitry techniques has resulted in considerable progress in development of the data link antenna switch. Computations were conducted to obtain data for predicting orbital paths of the vehicle in anticipation of the ground tracking operation, and for commanding initial call-down of the biosatellite recovery capsule operation. A report on the "Preliminary Estimates of Reliability on the Ground-Spaced Communication System" has been published.

3. Requirements for tracking and acquisition sites necessary for obtaining data from the THOR-boosted ARS vehicle launchings from Cooke Air Force Base have been established. A total of five tracking and acquisition stations will be required. One station will be provided at Cooke, and a down-range tracking station will be located in the vicinity of Oxnard, California. One of the remaining three stations will be located in Hawaii, and two will be in Alaska. One Alaska station will be in the Anchorage area; the other will be in the Sitka area.

4. Radio frequency allocations for data transmission have been granted for the THOR and ATLAS-boosted ARS programs.

H. DATA PROCESSING SUBSYSTEM

A contract with The Ramo-Wooldridge Corporation provides for the design and implementation of the intelligence data handling subsystem (Subsystem I). Major subcontracts were negotiated by R-W in this period with ITEK Corporation for the major optical assemblies and devices; Broadview Research Corporation for photo interpretation keys and equipment requirements; Systems Laboratories Corporation for geodetic calculations and applications; and Planning Research Corporation for application of their intelligence parameter work.

I. QUALITATIVE PERSONNEL REQUIREMENTS INFORMATION

The Qualitative Personnel Requirements Information (QPRI) program for ARS progressed satisfactorily. The initial QPRI Conference for the program was held at Palo Alto, California, on 3 June 1958. A QPRI report was published on 30 June by the Air Force and the Lockheed Missile Systems Division. The report is time-phased for an operational date of early 1961 for the Pioneer Visual and Pioneer Ferret subsystems, and is concerned primarily with satellite requirements which can be defined at this time. A complete QPRI report will be distributed about 1 January 1959.

J. FACILITIES DATA

1. The south Cooke Air Force Base area was selected as the optimum location for conducting ARS launches. Air Staff approval was obtained to site two launchers and a blockhouse for the ARS program in that area, subject to conformance with the Navy master plan. Naval authorities at Point Mugu agreed to site the facility as presented by the Air Force. Launch facility design criteria were reviewed in June.

2. Design criteria for the ATLAS-booster launch complex at Cooke Air Force Base have been submitted. Architect-engineer contract award is scheduled for early in July 1958. An architect-engineer contract for design of the missile assembly building will be awarded in July. Modification of existing buildings to provide an interim assembly facility started on 3 June and is scheduled for completion in mid-August 1958. Construction of launch stands and blockhouses for the THOR-booster launch complex at Cooke progressed on schedule. Modification of existing buildings for an interim missile assembly facility began in June. Modifications to assembly building E at the Air Force Missile Test Center, Florida, are scheduled for completion in September 1958.

3. Construction drawings and specifications for an interim tracking and telemetry station at Cooke have been completed. Construction will be completed by 15 August and equipment will be installed by 1 November. Design of the entire station has been initiated and is scheduled for completion in September 1958.

4. Design criteria for the ARS intelligence interpretation and dissemination facility were completed and made available for review during June. This facility will serve as the program control center, as the collection center for all reconnaissance data obtained from the data acquisition stations, and as the training center. Construction is scheduled to start in December 1958. The facility is expected to be ready for use by the need date, March 1960. The location for the Central Intelligence Center is unresolved.

5. The site survey team recommended Fort Stevens, Oregon, for the site of the northwest United States tracking and data acquisition station. Electronic surveys indicated the suitability of the area for ARS operations. Site Selection Board approval was obtained and recommendations for the area have been approved by Headquarters, USAF. Design criteria for this station is being reviewed and a contract for architect-engineer services for the design will be awarded early in July.

6. Electronic surveys of proposed locations for the northeast U. S. tracking and data acquisition site were completed on 31 May. At the meeting of the Site Selection Board on 9 June Sampson Air Force Base, New York, was selected as the first choice for the northeast site. Permission

to survey Sampson Air Force Base was denied, however, and an electronic survey team was directed to make additional surveys of possible sites. It was decided to electronically survey the Veterans Administration property at Togus, Maine, and the New Boston Range, New Hampshire, as possible locations. The Board is scheduled to meet again on 7 July to decide upon a firm site. Ottumwa, Iowa, and Fort Crowder, Missouri, were selected for possible use as the Central U. S. tracking and data acquisition station. These surveys will start on 7 July.

7. Construction drawings and specifications have been completed and released for construction of the interim tracking and data acquisition station at Kaena Point on the Island of Oahu, Hawaii. A construction contract was awarded in May. Beneficial occupancy date is 15 August, and installation of equipment will begin at that time. The need date is November 1958. Design of the complete station will be completed by 1 September. Access road construction is complete. Need date for the complete station is 1 October 1959.

8. An existing aircraft control and warning station at Cape Chiniak, Kodiak Island, Alaska will be used as an auxiliary test tracking station. This arrangement will eliminate the need for construction of new facilities in that area.

9. A construction contract for the auxiliary test tracking station at Annette Island, Alaska, will be awarded in July. Completion is scheduled for mid-August. Need date for this facility is 1 November 1958.

10. A facility to house laboratory equipment and instrumentation for analysis of technical information will be built at Wright-Patterson Air Force Base. Criteria for the facility, which will be needed by March 1960, has been developed.

ADVANCED RECONNAISSANCE SYSTEM

GLOSSARY

PROGRAMS

Program I	ATLAS-boosted Engineering Prototype Test
Program IIA	Engineering Test and Biomedical Program
Program II	Pioneer Visual Reconnaissance Program
Program III	Pioneer Electronic Reconnaissance Program
Program IV	Advanced Visual Reconnaissance Program
Program V	Advanced Electronic Reconnaissance Program
Program VI	Visual Surveillance Program
Program VII	Infrared Surveillance Program
Program VIII	Electronic Surveillance Program

PROPULSION

Booster	ATLAS and THOR Missiles	
ARS	XLR81-Ba-3	15,150-lb thrust engine; pump-fed; 263 lb sec/lb vacuum specific impulse; JP-4/IRFNA
	XLR81-Ba-5	15,150-lb thrust engine; pump-fed; 277 lb sec/lb vacuum specific impulse; UDMH/IRFNA

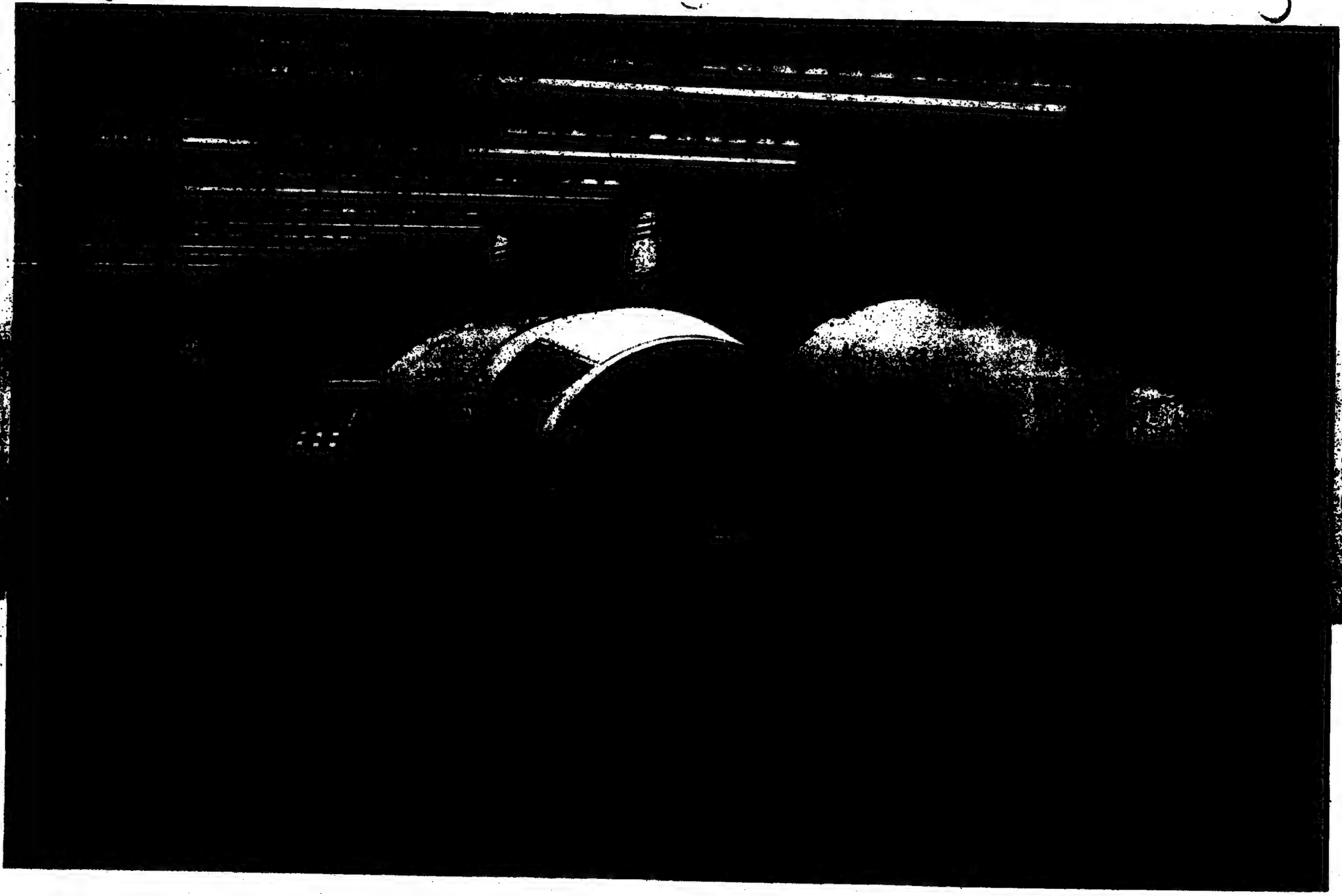

Figure 1. Exploded view of the WS-117L vehicle mockup and ATLAS adapter showing from front to rear: (A) Nose cone with detachable nose cap (B) Midbody with forward and aft equipment racks (C) ATLAS adapter section (D) Un-installed, spherically nested fuel and acid tanks for the vehicle.

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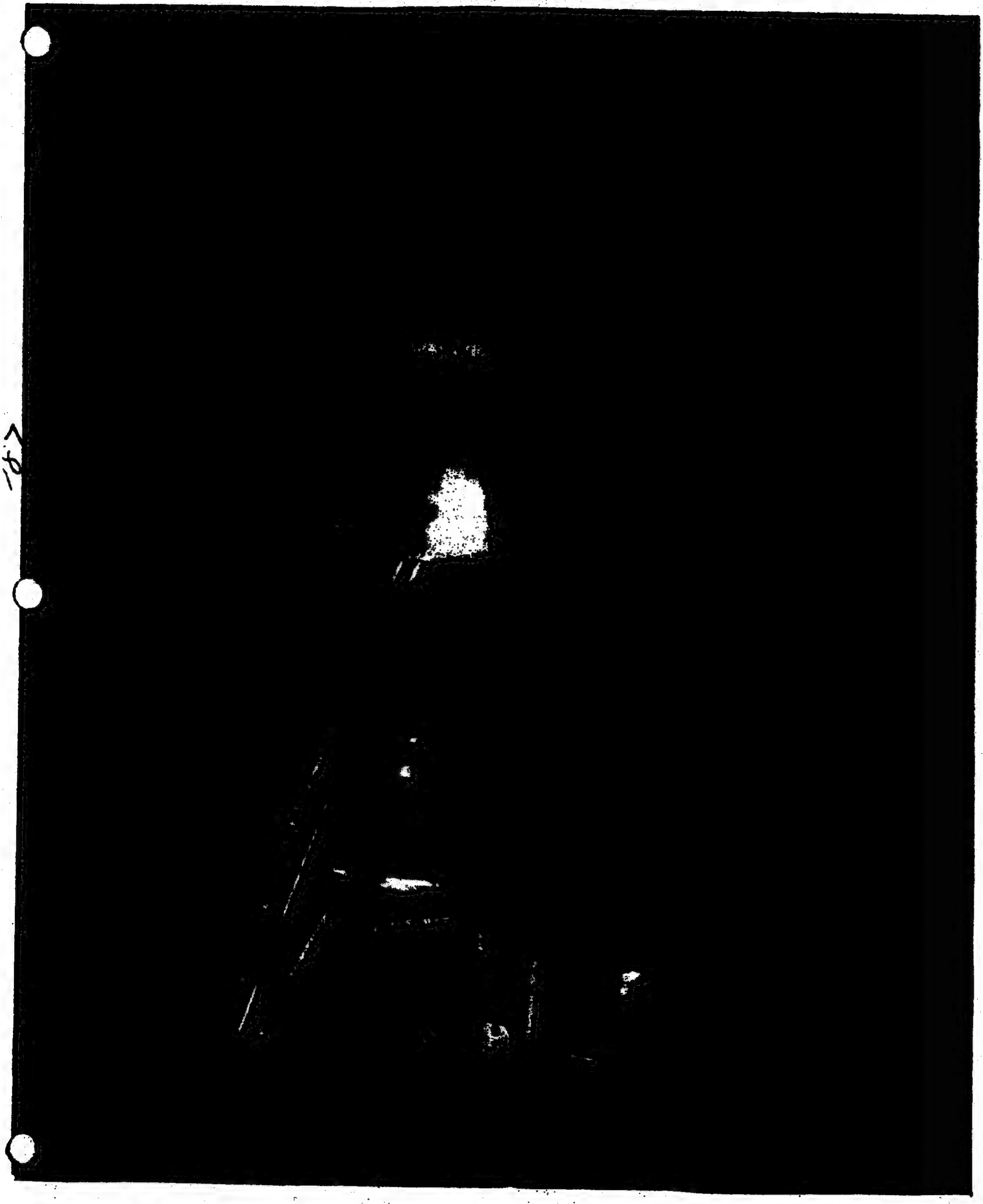

Figure 2. Final stage, gimbal-mounted engine.

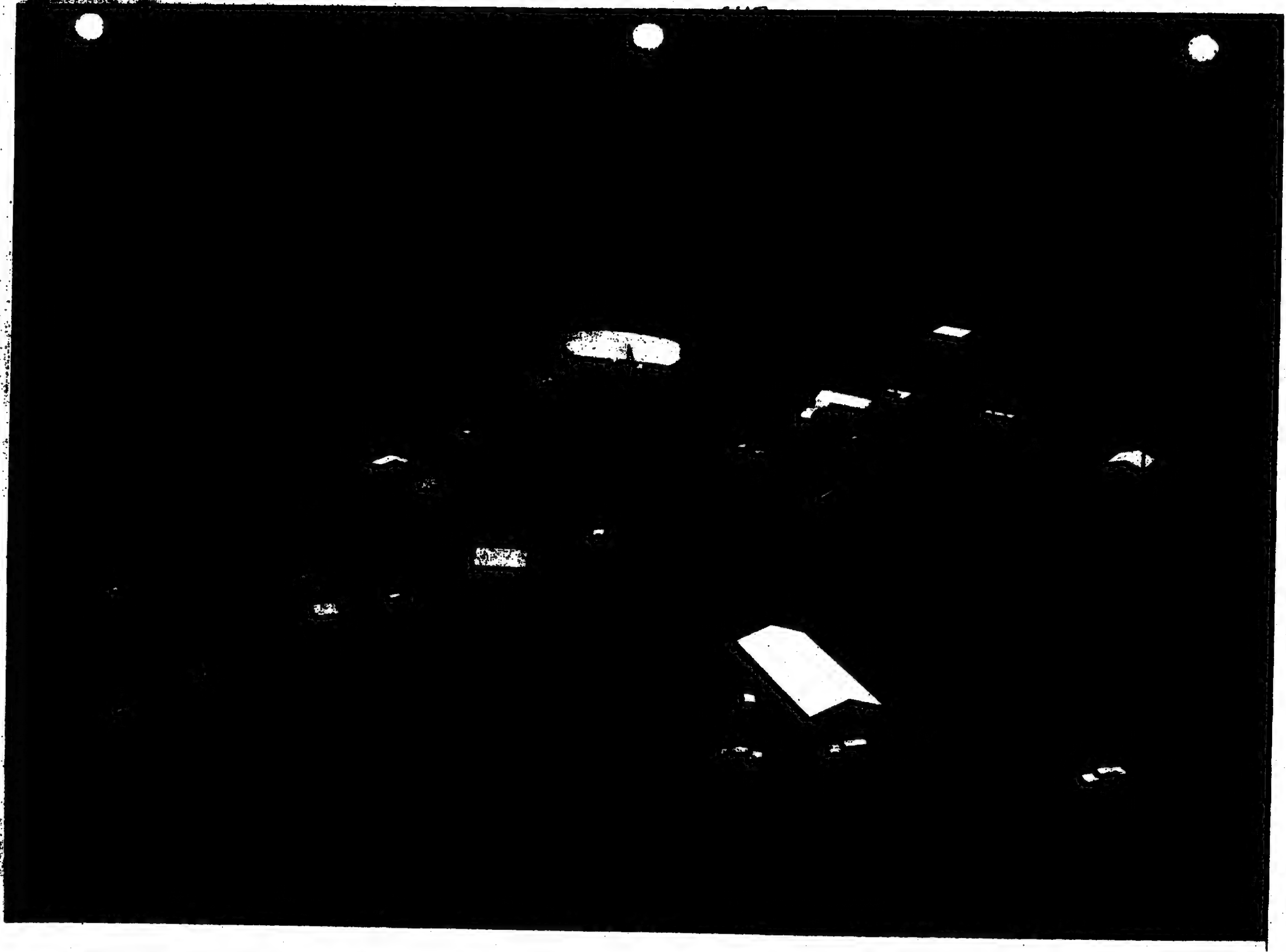

Figure 3. Static firing test stands and instrumentation blockhouse at the Lockheed Missile Systems Division, Santa Cruz Test Base.

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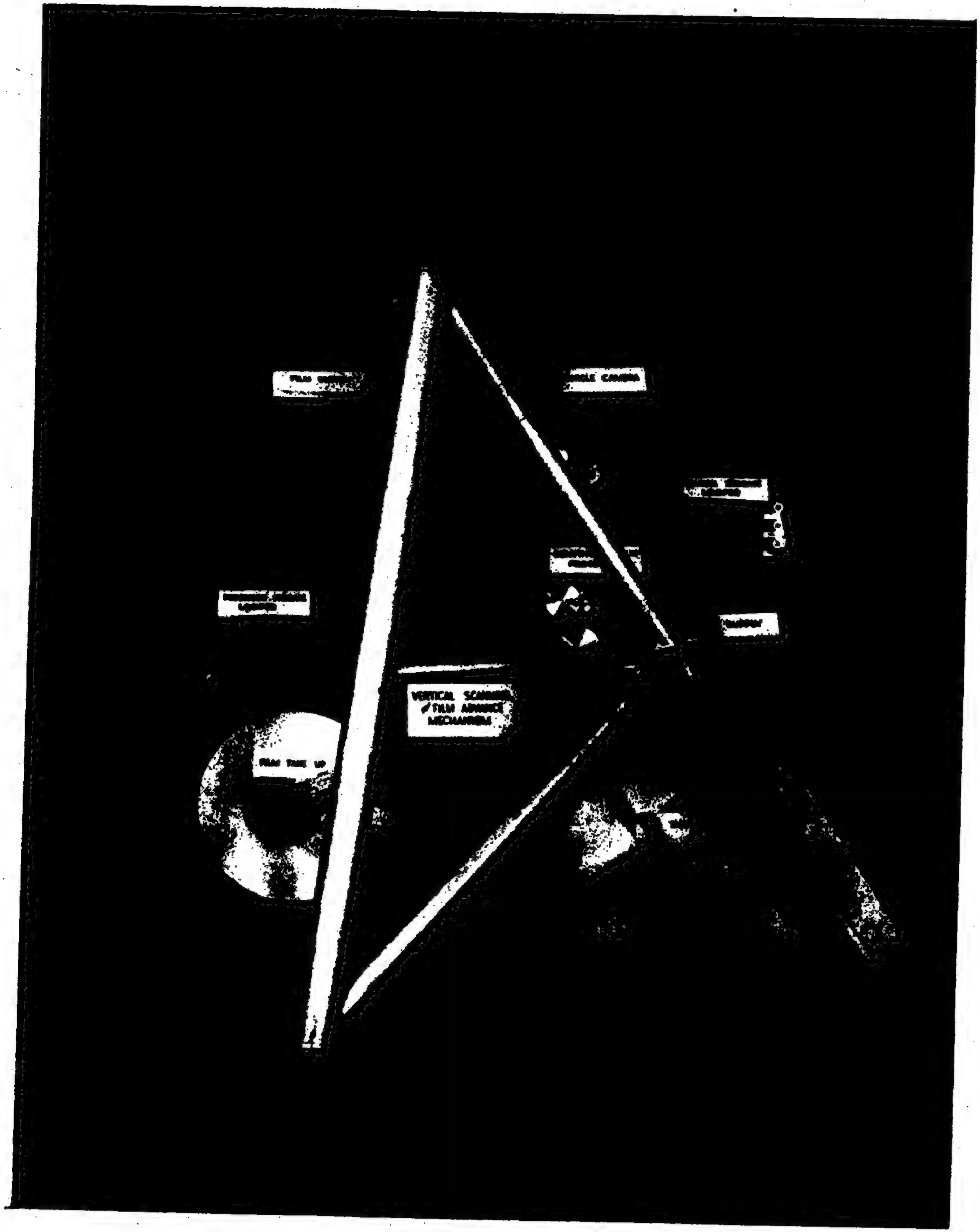

Figure 4. Visual reconnaissance payload mockup.

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Assistant CINCSAC (SAC MIKE)	3
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~~(SECRET)~~ FROM WDGO-6-4

ACTION FOR AFCGM COL KRIEGER AND INFO FOR AFOIE GEN RENTZ. REOURMSG WDTSR 6-17-E, DATED 13 JUNE, WHICH REQUESTED DECISION RE SITING INTELLIGENCE CENTER FOR WS-117L. THERE ARE CURRENT PROPOSALS RELATIVE TO USE OF SATELLITES FOR COMMUNICATIONS, WEATHER, ANTI-BALLISTIC MISSILE EARLY WARNING, AND OTHER PURPOSES. THE PROBABILITY IS HIGH THAT THESE OR SIMILAR PROPOSALS WILL BE ACCEPTED. THE COMMUNICATIONS NET AND ORGANIZATIONAL PROVISIONS FOR THESE WILL OVERLAP AND BE SIMILAR IN NATURE AND EXTENT TO THOSE REQUIRED FOR INTELLIGENCE PURPOSES. THE WS-117L SYSTEM IS THE ONLY SATELLITE PROGRAM WITH HARDWARE OF SUBSTANTIAL SIZE BEING INTEGRATED INTO A FULLY OPERATIONAL CAPABILITY, HENCE THE SO-CALLED "INTELLIGENCE CENTER" WILL FOR SEVERAL YEARS BE UNESCAPABLY THE HUB OF ANY MAJOR SATELLITE OPERATING EFFORT (AS CONTRASTED TO R&D). AFBMD THEREFORE RECOMMENDS THAT A FULL-SCALE SITE SELECTION FOR THIS FACILITY BE SEPARATELY ACCOMPLISHED BY THE PRESENTLY CONSTITUTED WS-117L SITE SELECTION BOARD AND REQUESTS THAT WE BE SO DIRECTED. IMPORTANT ELEMENTS OF THE CRITERIA FURNISHED SHOULD INCLUDE THE PROBABILITY OF A SUBSTANTIAL FACILITY

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DRAFTER'S NAME (and signature, when required): Col Sheppard

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SECURITY CLASSIFICATION: SECRET

PAGE 1 OF 2 PAGES

RELEASING OFFICER'S SIGNATURE

WILLIAM A. SHEPPARD
~~COLONEL,~~ USAF
Ass't for Special Projects WDGO-58-11

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JOINT MESSAGEFORM - CONTINUATION SHEET [redacted] CLASSIFICATION

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FROM

COMDR AFBMD INGLEWOOD CALIF

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EXPANSION TO ACCOMMODATE MISSIONS OF THE KIND MENTIONED ABOVE AND THE RELATED COMMUNICATIONS NET PROBLEMS.

152

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Gen Ritland:
1- For your supervision at the meeting
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NEXT

WDG 2 July 1958

MEMORANDUM FOR THE RECORD

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ACTION MEET- 2 JULY 58

3

SUBJECT: Operational Planning for WS-117L

In a meeting attended by General Schriever, General Ritland, Colonel Terhune, Colonel Sheppard, Colonel Evans, Colonel Oder, and Lt Colonel Boatman, 1000 hours, 2 July 1958, the following actions were directed:

EVANS DONE 1pm

a. A letter will be sent to AFCGM which will furnish an AFBMD draft of the ARS Preliminary Operational Concept. This will be the same as that published by Hq USAF except that it will generalize on the definition of the hardware involved in lieu of the specific definitions in the Hq USAF version. The letter will advise that AFBMD is developing a Data Utilization Plan (DUP) for the R&D flights of WS-117L which will be submitted no later than the next revision of the WS-117L Development Plan.

EVANS DONE OM.

b. A team under WDT will be formed without delay to evolve the DUP. The DUP will be responsive to the AFBMD POC, particularly paragraph III B 1.

c. The DUP will be submitted as the Operational Annex to the next WS-117L Development Plan Submission.

d. SAC will be held responsible for submitting and supporting their hardware and facilities requirements for operational use of WS-117L and coordinating these requirements with AFBMD. The problem of establishing a schedule for such operations will be between CINCSAC and Hq USAF. The manner by which SAC's requirements will be programmed (AFBMD Development Plan vs normal SAC channels) will be determined after these requirements have been reviewed.

SHEP ✓

e. The team referred to under paragraph b, above, will also develop a National Operational Concept for WS-117L. This Concept will be more broad and inclusive than the present POC. The Concept and the fact it is under preparation will be closely held within AFBMD.

21 JULY 58.

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ORG.
FUNCTIONS.
RESPONSIBILITY

B. A. SCHRIEVER
Major General, USAF
Commander

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~~MOVE ALL INTERNAL REFERENCES BY DATE-TIME~~
~~GROUP PRIOR TO DECLASSIFICATION"~~

~~S E C R E T~~/ CITE AFOOP-OC-R 53126. REFERENCE YOUR MSG WDTSR-6-17-E DATED 13 JUNE 1958 AND WDCO-6-4 DATED 2 JULY 1958. THAT PORTION OF THE SACOP 5-58 THAT LOCATES THE WS, 117L DATA PROCESSING FACILITY AT OFFUTT AFB IS APPROVED. REQUEST THAT THE LOCATION OF THAT FACILITY BE PLACED ON THE AGENDA OF THE WS 117L SITE SELECTION BOARD MEETING SCHEDULED FOR 22 JULY 1958 SO FORMAL ACTION CAN BE ACCOMPLISHED.
BT
THIS AC MSG
11/0656Z JUL RJWZNF

[redacted]

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WDS MW-58
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DECLASSIFIED AFTER 12 YEARS.
DOD DIR 5200.10

15 JUL 1958

WDTSR

SUBJECT: (UNCLASSIFIED) Preliminary Operational Concept WS 117L

TO: Chief of Staff
Headquarters USAF
ATTN: Assistant Chief of Staff for Guided Missiles
Washington 25, D. C.

1. The inclosed Preliminary Operational Concept (POC) for WS 117L prepared by this Division is forwarded for your consideration. While closely similar to the POC for WS 117L published by Hq USAF, it uses less restrictive description of the equipment to be employed.

2. The Air Force Ballistic Missile Division has under preparation a Data Utilization Plan which will be responsive to those aspects of the Weapon System Program which are an ARDC function under the POC. The plan will maximize the utilization of reconnaissance data acquired during the period when flights are made under ARDC control.

3. It is our purpose to submit the completed Data Utilization Plan as soon as possible, not later than the next submission of the WS 117L Development Plan.

1 Incl:
3 Cys(1,2 & 3)
POC for WS 117L
(SECRET) 22 pgs ea cy
WDTSR 58-354
and Multilith Masters

SIGNED

O. J. RITLAND
Brig. Gen., USAF
Vice Commander

DOWNGRADED ...
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[redacted]

WDTSR dh(9 Jul 58)
Col Oder 2751

~~SECRET~~

WDTSR 58-359
Cy 5 of 7 Cys

X7-166

JOINT MESSAGE FORM ~~CONFIDENTIAL~~

SECURITY CLASSIFICATION [redacted]

59

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ACTION	[illegible]	BOOK	MULTI	SINGLE			
INFO	[illegible]			X	AF	AFBMD-EX [illegible]	[illegible]

FROM: COMDR AFBMD (ARDC) INGLEWOOD, CALIF

SPECIAL INSTRUCTIONS

TO: COFS USAF WASH D C

INFO: COMARDC ANDREWS AFB MD

DOWNGRADED AT 12 YEAR INTERVALS; NOT AUTOMATICALLY DECLASSIFIED. DOD DIR 5200.10

196

[illegible]-FROM WDGBR 7-45-E. FOR AFBMD-EX. INFO [illegible]. REF YOUR MESSAGE AFBMD-EX 58207 DATED 16 JUN 58. AFBMD IS IN AGREEMENT WITH YOUR COMMENTS. PAYLOADS AND THE ENTIRE DATA PROCESSING SYSTEM, AS WELL AS SATELLITE VEHICLES THEMSELVES, MUST UNDERGO A PERIOD OF DETAILED AND DIFFICULT DEVELOPMENT AND TESTS. AN OPERATIONAL PROGRAM CONDUCTED CONCURRENTLY WITH THE FIRINGS LISTED IN THE DEVELOPMENT PLAN WOULD REQUIRE DIVERSION OF RESOURCES FROM THE R&D PROGRAM AND THUS PREVENT THE TIMELY DELIVERY OF AN ADEQUATELY DEVELOPED SYSTEM. IF ADDITIONAL VEHICLES, FACILITIES OR OTHER PROCEDURES ARE REQUIRED FOR SOME OPERATIONAL OR TRAINING REASON PRESENTLY UNDEFINED, THE RESULTANT PROGRAM SHOULD BE CONSIDERED AS ADDITION TO THE R&D PROGRAM ~~AND [illegible]~~. ~~THIS IS~~ IN ACCORDANCE WITH ~~[illegible]~~ AFBMD, [illegible] PRELIMINARY OPERATIONAL CONCEPT OF IXYL, DATED 15 JUL 58. FUNDS FOR SUCH ADDITIONAL EFFORTS WOULD HAVE TO BE PROVIDED OVER AND ABOVE THE FUNDS PRESENTLY PROGRAMMED AND BUDGETED.

DATE		TIME
MONTH	JUL	YEAR 1958

WRITER NAME AND TITLE (Signature, if required)

[illegible] L. [illegible], [illegible]/[illegible]/[illegible]/Ext. of PAGES 1

SECURITY CLASSIFICATION [redacted]

RELEASER /s/ O J Ritland

TYPED (or stamped) NAME AND TITLE

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59

DD FORM [illegible] 1 OCT 49, WHICH WILL BE USED [redacted]

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[illegible]

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[illegible]

WDGCH-45

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[illegible]

CONFIDENTIAL

CONFIDENTIAL

[illegible]

CON[illegible]IAL

k. It could be used [illegible] in the connection of data from nuclear [illegible] detection of nuclear explosions.

l. [illegible] for providing [illegible] [illegible] operations.

m. [illegible] mapping.

[illegible] of these applications would require modification only to the [illegible] of the airborne portion of the system. Launch, data transmission and data reduction, which are the functions of the system requiring large resources, remain essentially unaffected by the particular use.

[illegible] sophisticated versions many other applications, both military and non-military, will be feasible, such as early warning, ferreting, jamming, [illegible] platforms and space exploration. Undoubtedly it will have a number of [illegible] uses. Most [illegible] advances in technology invariably do [illegible] range of applications than those initially envisioned.

[illegible] of the [illegible] system [illegible] [illegible] and [illegible]

To avoid restricting future decisions with respect to space sovereignty the initial organization and operational concept should not emphasize the military applications but should be evolved in terms of a system operated by the military as a service to others as well as itself.

In the same general tone it would be desirable to rename the 117L. It might be referred to as the American Space Observatory and launched as an extension of the IGY.

Operation by the military is logical in that only the military has the resources, organizational pattern and experience necessary to support such an effort. A case in point is the Antartic expedition where scientists are gathering data, but only as the result of a major U.S. Navy effort, assisted by the Air Force. In turn, operation by the Air Force is dictated by virtue of the most experience and greatest capability in this field. The Air Force has an established production and R&D base, enormous investments in the required test and test support facilities and the trained personnel.

It is recommended that the Air Force create a service organization which will:

1. Fully and expeditiously exploit the present and future potential of the 117L system.

2. Provide flexibility for future U. S. positions on space sovereignty.

3. Not be subordinated to an organization having an overpowering mission requiring singularity of purpose and application of resources.

[redacted]

~~CONFIDENTIAL~~ Aug 61

WEAPON SYSTEM 117L PROGRAM STATUS REPORT

For Month Ending 31 July 1958

RCS DD-SD(M) 242

Prepared by
AIR FORCE BALLISTIC MISSILE DIVISION
HEADQUARTERS
AIR RESEARCH AND DEVELOPMENT COMMAND
United States Air Force
Post Office Box 262
Inglewood, California

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WDPC-58-24
Copy 110 of 125

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AIR FORCE BALLISTIC MISSILE DIVISION
HEADQUARTERS
AIR RESEARCH AND DEVELOPMENT COMMAND
United States Air Force
Post Office Box 262
Inglewood, California

WDPC

8 August 1958

WEAPON SYSTEM 117L PROGRAM STATUS REPORT
For Month Ending 31 July 1958
RCS DD-SD(M) 242

203

FOREWORD

This is the fourth report to ARPA on the activities in the Weapon System 117L program. The report summarises program progress during the month of July and will be consolidated with August and September information for inclusion in a formal quarterly report as of 30 September.

The SENTRY program has progressed satisfactorily and is on schedule.

B.A. Schriever
B. A. SCHRIEVER
Major General, USAF
Commander

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~~CONFIDENTIAL~~

WEAPON SYSTEM 117L PROGRAM STATUS REPORT
For Month Ending 31 July 1958
RCS DD-SD(M) 242

I. BRIEF OF PROGRESS

Flight test objectives have been determined for each of the ten engineering and biomedical test vehicles which comprise Program IIA. There are presently nine different programs planned in the SENTRY development. The ten SENTRY vehicles of Program IIA will have orbits between 160 and 240 statute miles.

The first THOR-boosted SENTRY test vehicle was moved from manufacturing to checkout and modification at Lockheed Missile Systems Division. It is to be moved to the Santa Cruz, California test site on 27 August on schedule.

2 of

Development of all subsystems is proceeding on schedule.

Construction is proceeding as planned on the tracking and telemetry stations at Cooke Air Force Base, California; Kaena Point, Oahu, Hawaii; and Annette Island, Alaska. Initial occupancy at these sites is scheduled for 15 August.

Fort Stevens, Tongue Point, Oregon, has been approved as the Northwest tracking site. Recommendations have been made to use a bombing range near Grenier Air Force Base, New Hampshire, for the Northeast site and the deactivated Naval Air Station at Ottumwa, Iowa, for the Central site.

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[redacted]

WEAPON SYSTEM 117L PROGRAM STATUS REPORT
For Month Ending 31 July 1958
RCS DD-SD(M) 242

II. TOPICAL SUMMARY

A. FLIGHT TEST PROGRAM

1. Flight test objectives for Program IIA flights (see Glossary) have been determined as follows:

Flight No.	Orbit Altitude (Statute Miles)	Flight Objectives
1	225	Engineering Tests
2	190	Engineering Tests
3-4	145	Biomedical Experiments
5-7-9	240	Engineering Tests
6-8-10	160	Biomedical Experiments

2. The detailed test plan for the first SENTRY flight vehicle is being prepared. Flight test objectives for Program I (see Glossary) have been published. System test objectives for Program II are being developed.

3. The first THOR-boosted flight test vehicle entered the modification and checkout division of Lockheed Missile Systems Division on 14 July. This was 5 days later than scheduled; however, the modification and checkout schedule has been stepped-up to allow shipment of the vehicle to the Santa Cruz, California test base on 27 August as originally planned.

B. SATELLITE AIRFRAME SUBSYSTEM

1. Final design of the first two flight SENTRY vehicles has been completed.

2. The completion of the flight test objectives plan for Program IIA, noted above, permits equipment installation design to proceed on the remaining SENTRY/THOR vehicles.

3. In the propellant tank program, the spun aluminum tanks were successfully pressure tested. They were then installed in propulsion test vehicle assemblies #1 and #2 and in flight test vehicles #1 and #2. See Figures 1 through 6.

C. SATELLITE PROPULSION SYSTEM

The engines for flight test vehicles 1 and 2 have been delivered by Bell Aircraft to the Lockheed Missile Systems Division. One of these engines has successfully undergone five hot firings since delivery.

D. AUXILIARY POWER SUBSYSTEM

1. All components for the auxiliary power subsystem of the first SENTRY/THOR flight vehicle have been received by Lockheed. Acceptance testing is in progress.

2. Program IIA flights with THOR boosters will include test of a small solar battery. The battery will have an output of 1.10 watts. It is expected to be available for THOR-boosted flight #3, scheduled in June, 1959. Until this system is available for use, the payload equipment installed in the SENTRY will be powered by a nine pound mercuric oxide-zinc battery. The battery will give the equipment an operating life of about 30 days.

3. Development of the SENTRY/ATLAS primary battery package is now completed, and qualification testing has begun.

4. Plans for the SENTRY/ATLAS solar battery tests in Program I are proceeding satisfactorily.

E. BIOMEDICAL SUBSYSTEM

1. During July a contract was let for ground support animal vans to support the biomedical tests planned in Program IIA.

2. Plans were completed for the bio-package assembly for SENTRY flights #3 and #4. Larger bio-packs for small animals are planned for SENTRY flights #6, #8, and #10 on which the engine using a higher energy fuel (UDMH) will be available.

F. FACILITIES AND SITES

1. Launch Facilities

a. Ralph M. Parsons Company has been selected as architect-engineer for design of the Cooke Air Force Base launch complex. Welton Becket and Associates have been selected for design of the assembly building.

b. Formal approval has been given for siting the SENTRY launch facility in the Point Arguello portion of the Pacific Missile Test Range located south of Cooke Air Force Base.

2. Tracking, Control Telemetry and Data Acquisition Facilities

a. Construction of interim tracking and telemetry facilities at Cooke Air Force Base is on schedule. Initial occupancy is planned for 15 August. Design of the permanent tracking facility, except for the data acquisition and processing building, has been completed. Design of the latter will be completed by 15 September.

b. Construction of interim tracking and telemetry facilities at the Hawaii site is on schedule, and initial occupancy is programmed for 15 August. Design of permanent facilities has been completed, and construction will begin in August. See Figures 7 and 8.

c. Construction of the tracking station on Annette Island, Alaska, began in July. The contract was let on 3 July. Initial occupancy is scheduled for 15 August.

d. Use of Fort Stevens, Tongue Point, Oregon, for the Northwest tracking and acquisition station has been approved by Headquarters USAF. Design criteria have been approved, and the architect-engineer selected. Design will commence in August.

e. The New Boston Bombing Range near Grenier Air Force Base, New Hampshire, has been recommended as the site for the Northeast development and operational tracking station. Request for approval of this site will be forwarded by the Air Force Ballistic Missile Division to Headquarters USAF in August.

f. The deactivated Naval Air Station at Ottumwa, Iowa, has been recommended by the Site Selection Board as the site for the Central development and operational tracking station. Approval will be requested in August.

3. Communications and Logistic Support

a. The administrative and data communications system interconnecting the seven SENTRY R&D sites is being installed by commercial communication contractors.

b. The Chiniak, Alaska, AC&W station has been reactivated by the Alaskan Air Command to support the SENTRY program. Logistic support for the other SENTRY stations is a combined Air Force-contractor effort.

c. At present, all communication and logistic support schedules are in consonance with the SENTRY flight test schedule.

G. OPERATIONS AND PLANS

Publication of a SENTRY Development/Operational Data Summary is expected by about 15 August. The purpose of this document is to furnish Lockheed Missile Systems Division with operational concepts to assist them in preparing qualitative personnel requirements information (QPRI). The QPRI will assist the Strategic Air Command in determining specific manpower for SENTRY operations.

H. MANPOWER AND ORGANIZATION

Initial estimates of manpower and organization requirements for the SENTRY program have been submitted to the Strategic Air Command with the recommendation they be included in appropriate program documents. The estimates are based upon Lockheed submissions and requirements outlined in the SENTRY Preliminary Operational Plan (SACOP 5-58).

[redacted]

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208

ADVANCED RECONNAISSANCE SYSTEM

GLOSSARY

PROGRAMS

Program I	ATLAS-boosted Engineering Prototype Test
Program IIA	Engineering Test and Biomedical Program
Program II	Pioneer Visual Reconnaissance Program
Program III	Pioneer Electronic Reconnaissance Program
Program IV	Advanced Visual Reconnaissance Program
Program V	Advanced Electronic Reconnaissance Program
Program VI	Visual Surveillance Program
Program VII	Infrared Surveillance Program
Program VIII	Electronic Surveillance Program

PROPULSION

Booster	ATLAS and THOR Missiles	
ARS	XLR81-Be-3	15,150-lb thrust engine; pump-fed; 263 lb sec/lb vacuum specific impulse; JP-4/IRFNA
	XLR81-Be-5	15,150-lb thrust engine; pump-fed; 277 lb sec/lb vacuum specific impulse; UDMH/IRFNA

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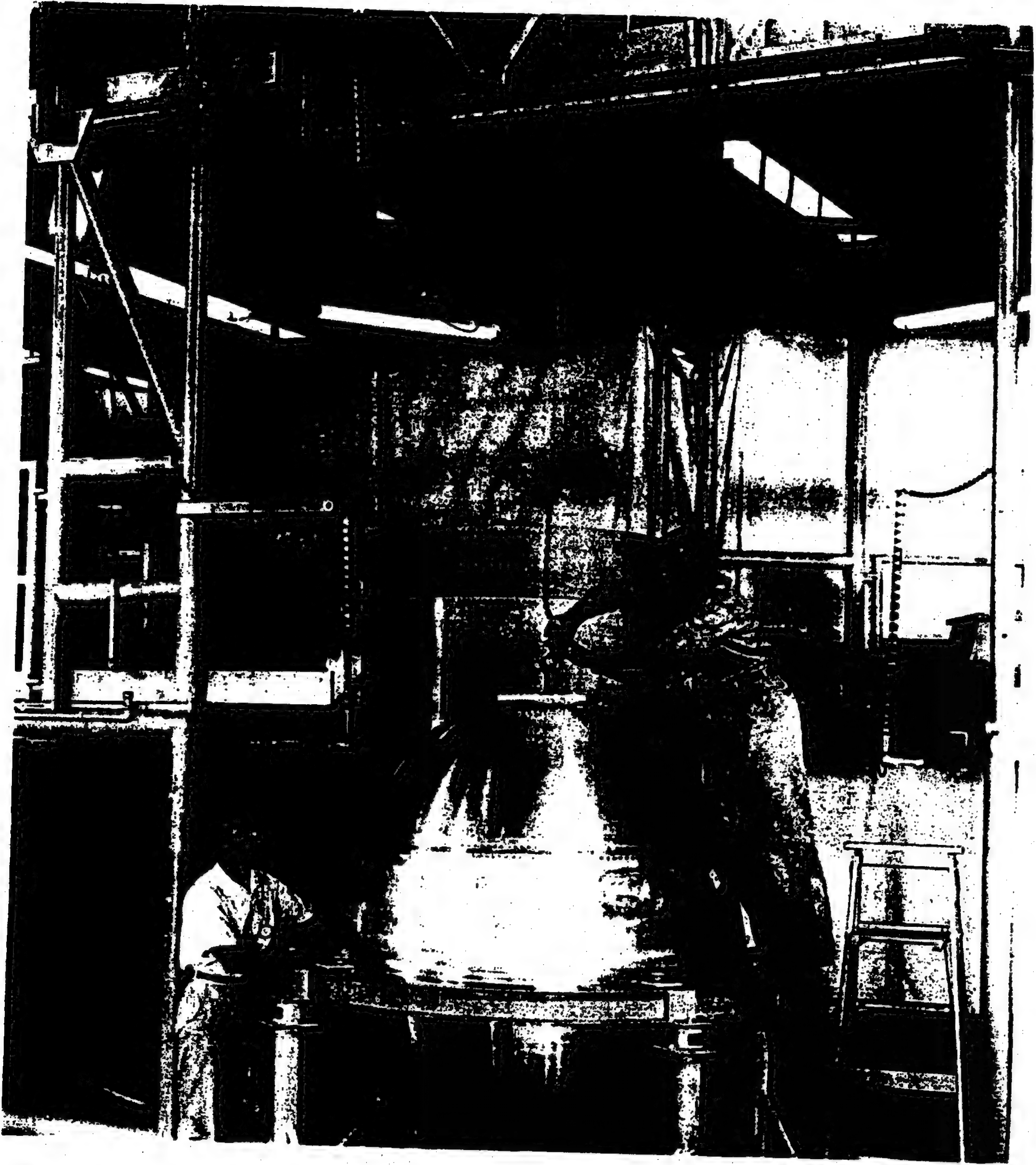

Figure 1. Propellant tank installation, mating of mid-body sections and alignment of vehicle airframe sections of the Sentry Vehicle are depicted in Figures 1 through 6. The spun aluminum fuel tank is shown here being prepared for installation in the aft-body section

(WDPC-58-24)

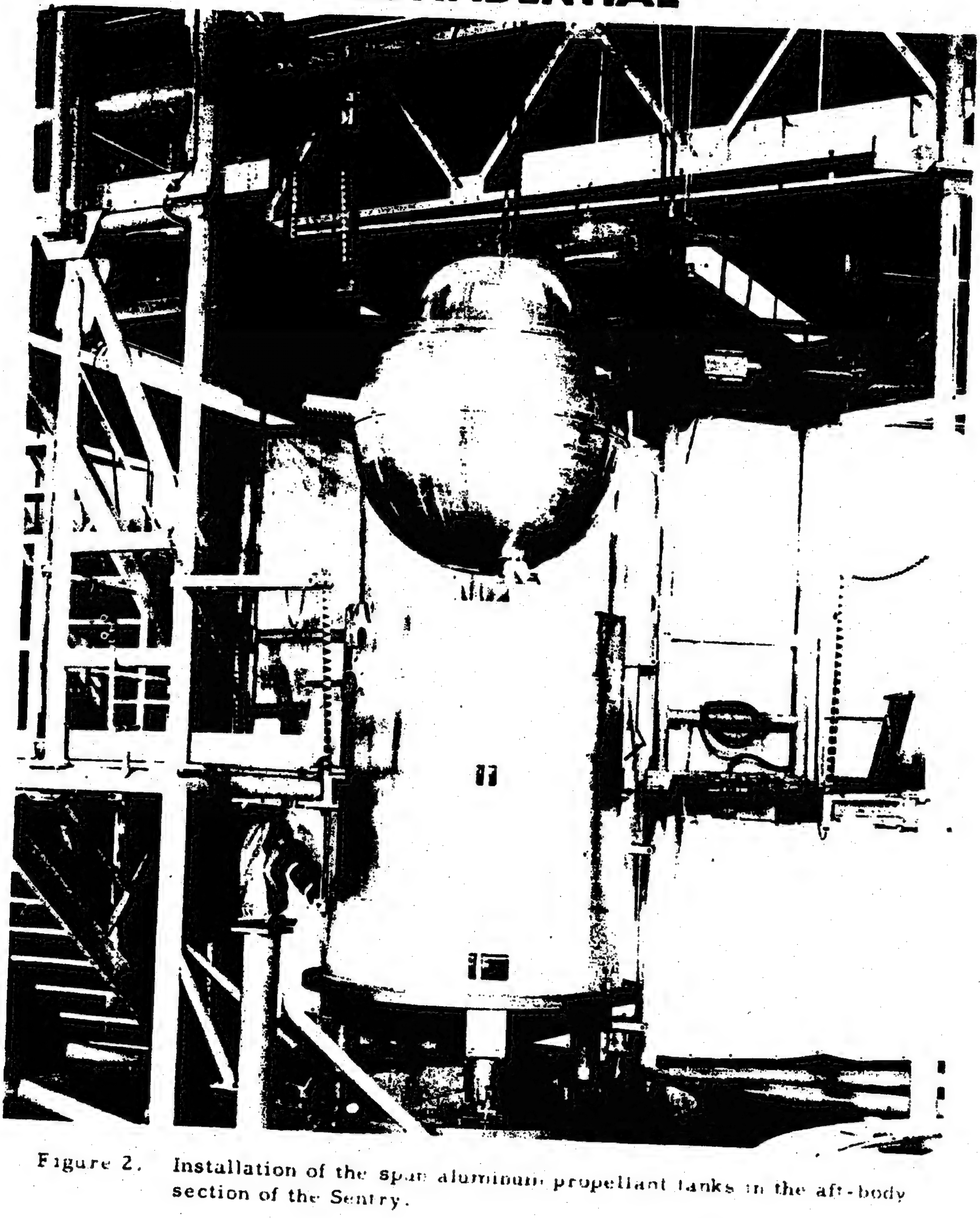

Figure 2. Installation of the spun aluminum propellant tanks in the aft-body section of the Sentry.

(WDPC-58-24)

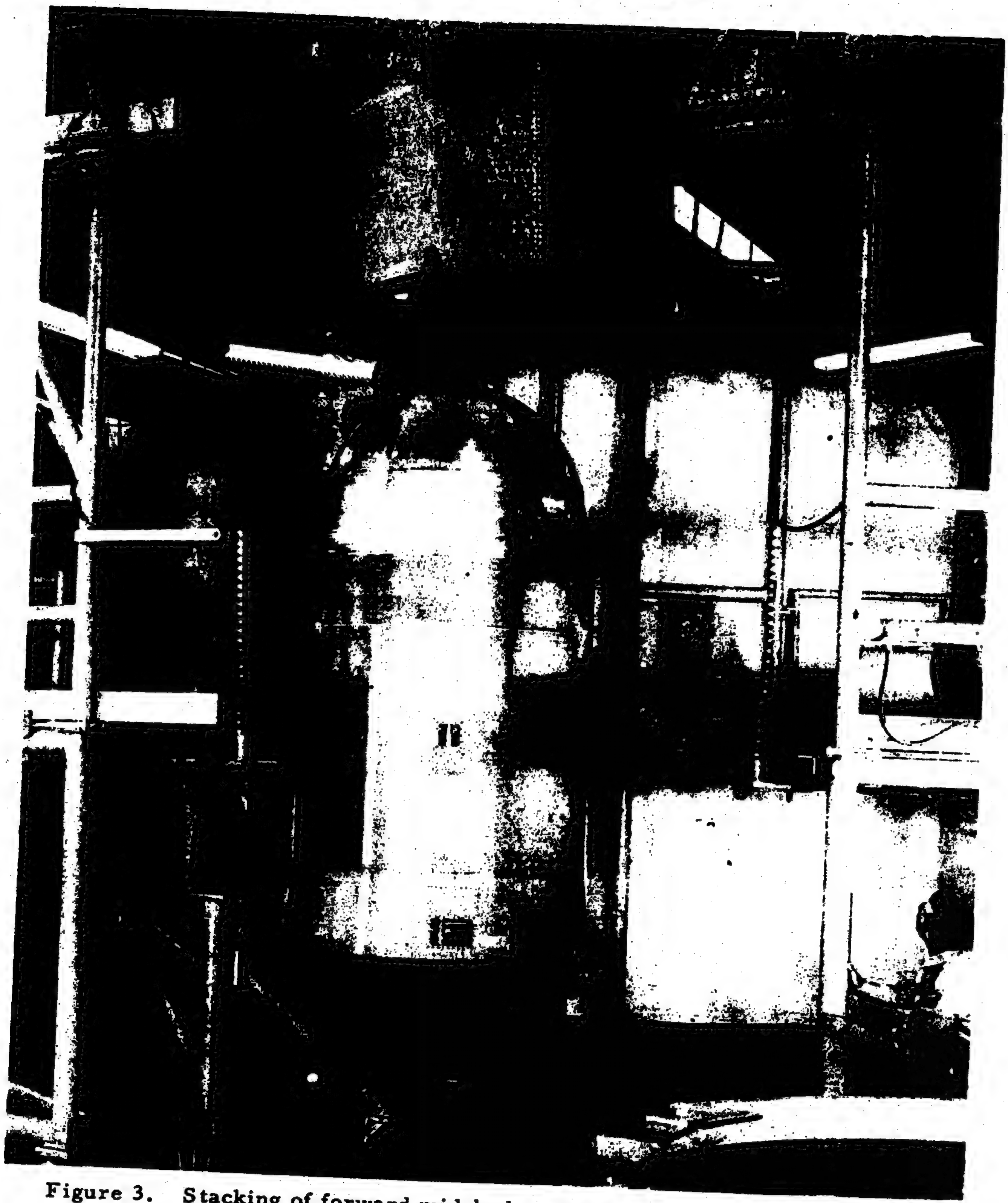

Figure 3. Stacking of forward mid-body sections, prior to mating with the aft-body section. (WDPC-58-24)

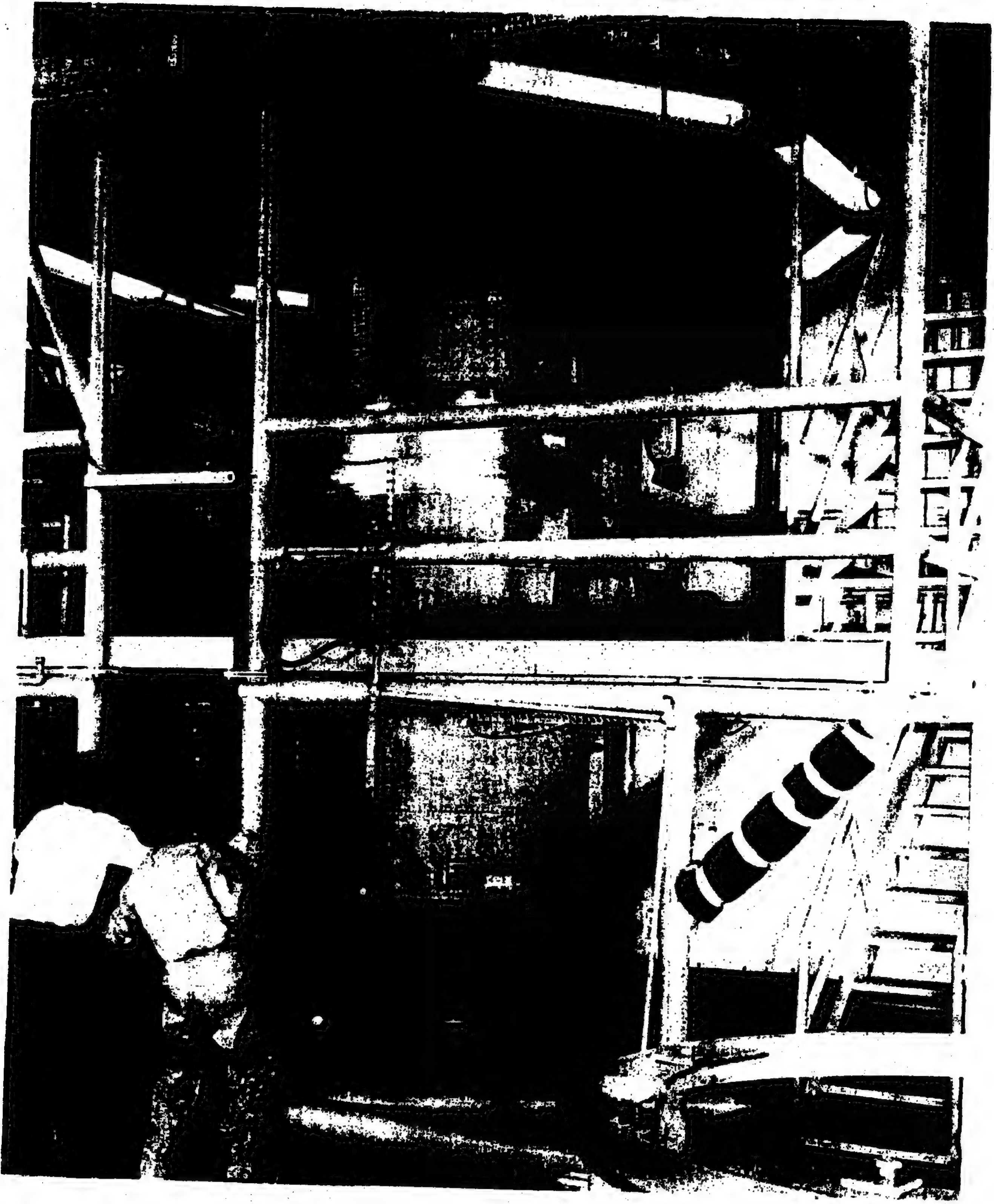

Figure 4. Mating of the forward mid-body sections with the aft-body section. (WDPC-58-24)

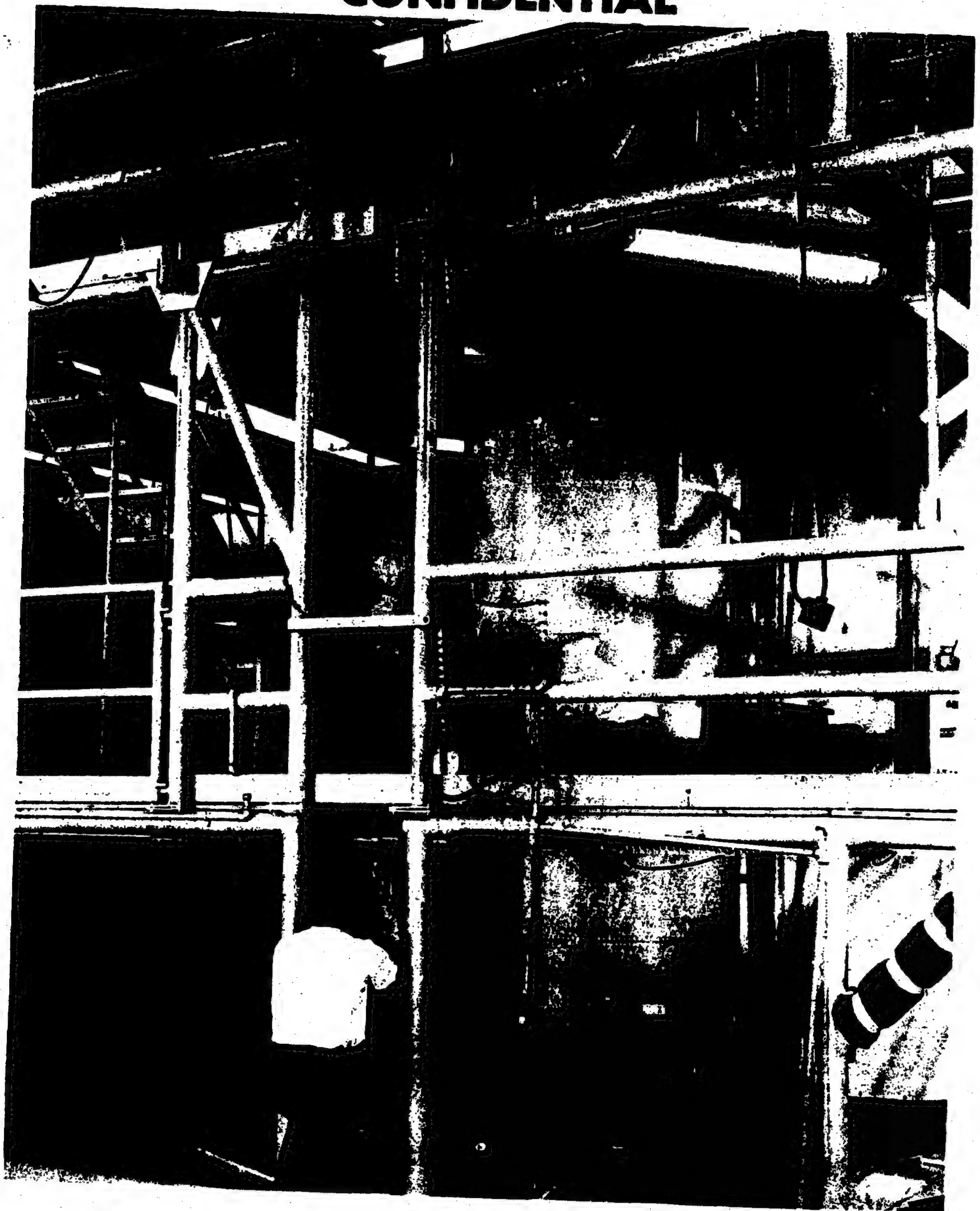

Figure 5. Aligning vehicle airframe sections. (WDPC-58-24)

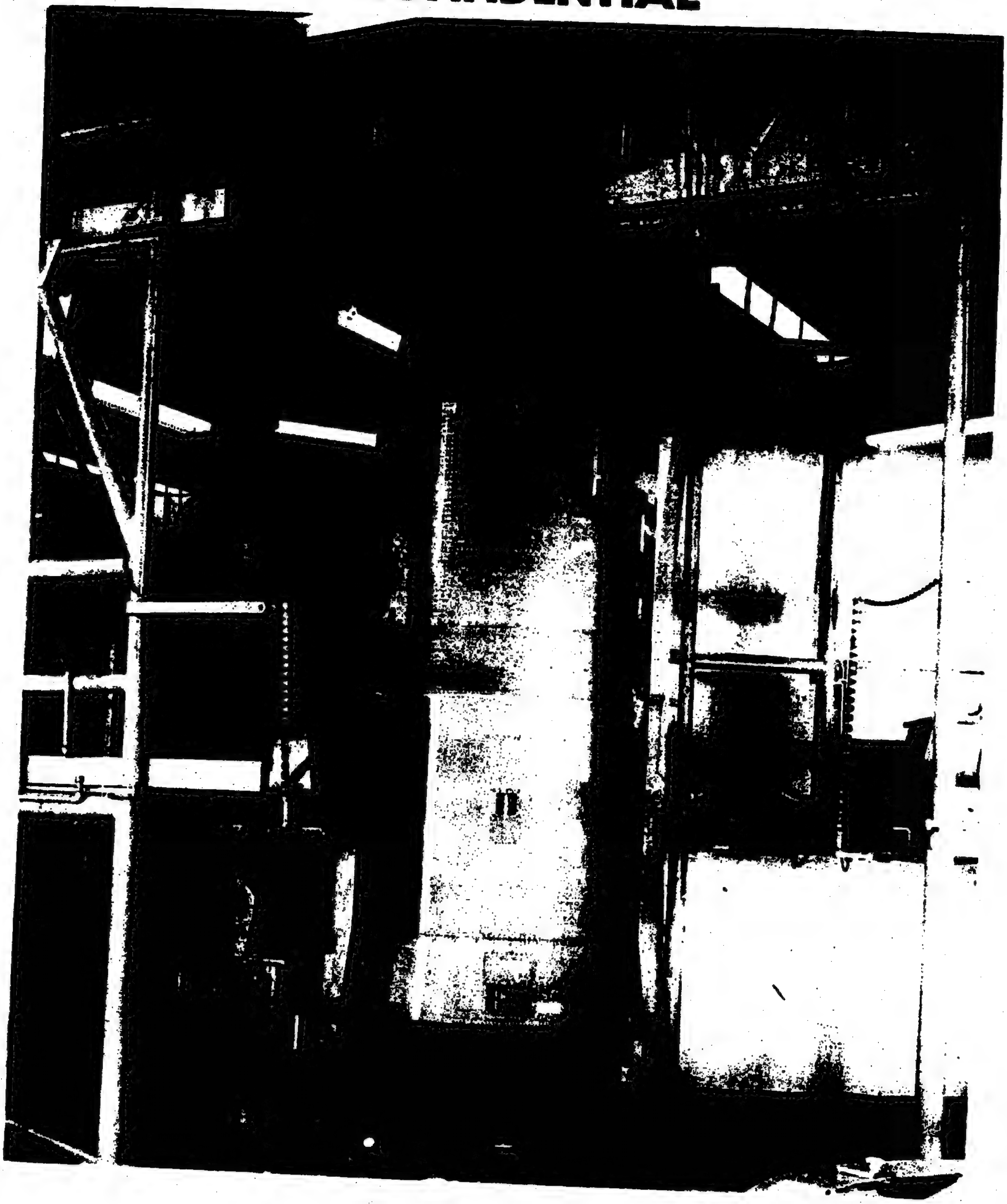

Figure 6. Airframe sections of the first flight article assembled.

(WDPC-58-24)

Figure 7. Construction progress at the Sentry tracking station Kaena Point, Oahu, Hawaii. (WDPC-58-24)

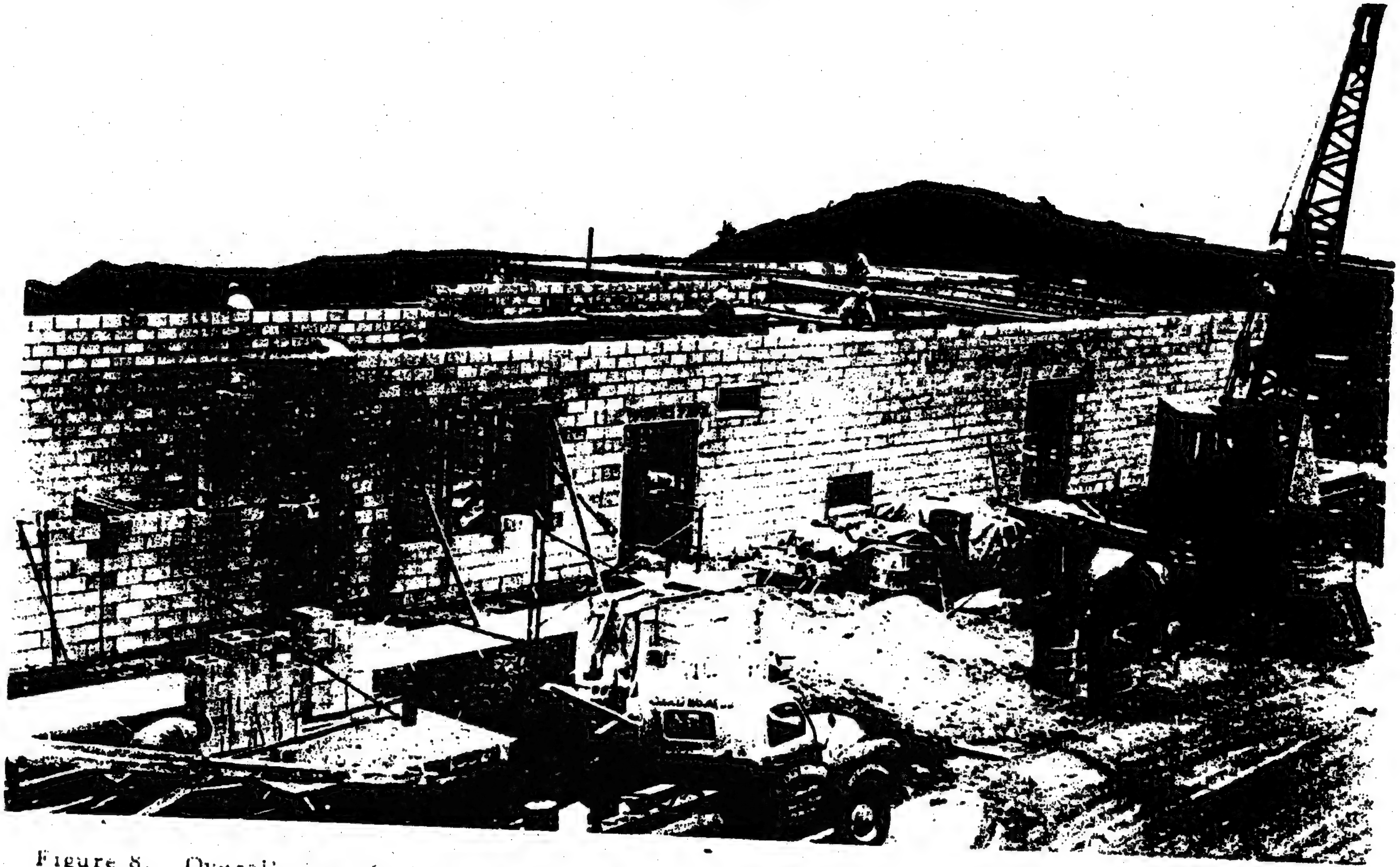

Figure 8. Overall view of administration building construction at Kaena Point, Oahu, Hawaii. This facility will be part of the instrumented tracking station that will monitor the flight of the Sentry advanced reconnaissance system. (WDPC-58-24)

[redacted] General Ritland

~~CONFIDENTIAL~~ 62

WDG

6 August 1958

MEMORANDUM FOR COLONEL CURTIN

SUBJECT: WS-117L R&D operations at Cooke Air Force Base

1. Below are listed items which require further attention in order that appropriate planning and programming actions can be taken. You are directed to establish an ad hoc Task Group under the supervision of the 117L program director, having representation from BMO, SAC-MIKE, WDS, and the SM-65 Program Office, to study and recommend a course of action with respect to these items not later than 15 August.

218

a. The question of using SAC crews to supervise the booster phase of the launch operation during R&D flights.

OVER SHOULDER

NOTE: General Funk, General Large, and the undersigned have substantially agreed that this should be contractor operated with over the shoulder training permitted for SAC military personnel.

b. Establish a date for initiation of operational flights for pioneer reconnaissance. All factors such as the test program, training, availability of facilities, etc., should be considered.

2158 1961

c. Launch and guidance facility requirements to accommodate simultaneous R&D operational flights. Detailed consideration should be given to the utilization of Complex 65-1 for operational flights and use of the GE Mod-II guidance for both operational and R&D flights.

TECH STUDY

d. RIM building requirements to accommodate receipt and check-out operations for both R&D and operational flight articles.

e. Delineate the responsibilities which each of the following agencies will have in support of 117L operations:

(1) First Missile Division

(2) Contractors, i.e., Convair, Lockheed, etc.

(3) AMC

6N

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(6) Pacific Missile Range.

In considering this item it must be assumed that additional Air Force R&D activities will be conducted from Cooke and Arguello in the foreseeable future. These will be limited to projects for which AFMTC is unsuitable.

219

B. A. SCHRIEVER
Major General, USAF
Commander

cc: General Funk - BMO
General Large - SAC/MIKE
Colonel Leonhard - WDI

~~CONFIDENTIAL~~

[redacted]

WDG-58-59

~~CONFIDENTIAL~~

Date 21 Aug 58

63

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P 212112Z

FM HEADQUSAF WASHINGTON DC

TO RJWZDK/COMAFBMD(ARDC) INGLEWOOD CALIF

INFO RJEZTF/COMARDC ANDREWS AFB MD

BT

~~S E C R E T~~/ FROM AFCGM 854133

FOR AFBMD ONLY. ATTENTION: COLONEL ODER. THIS CONFIRMS CONVERSATION [illegible] AUG 58 AT AFBMD HQ AND TEL/CON 19 AUG 58 BETWEEN COL ODER, AFBMD AND LT COL HEBRON, AFCGM. 1. IT IS REQUESTED THAT A COMPREHENSIVE BRIEFING ON THE ADVANCED RECONNAISSANCE SYSTEM(WS-117L) BE GIVEN AT HQ USAF ON 3 SEP 58 AT 1330 IN ROOM 4E-442. BRIEFING IS TO BE GIVEN TO SENIOR OFFICERS OF THE FOLLOWING AGENCIES: AIR FORCE INTELLIGENCE ARMY INTELLIGENCE, NAVAL INTELLIGENCE, CENTRAL INTELLIGENCE AGENCY, AND NATIONAL SECURITY AGENCY. ATTENDANCE IS BEING ARRANGED THROUGH MEMBERS OF THE AD AD HOC SATELLITE INTELLIGENCE REQUIREMENTS COMMITTEE. APPROXIMATELY 75 PERSONNEL WILL ATTEND. 2. BRIEFING SHOULD COMPODTEVTVTH

CONFORM

WDSMCC-58.2250

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[illegible] AT [redacted]

GENERALLY TO THE FOLLOWING GUIDE LINES:

PAGE TWO RJEKMD 418
A. SUMMARY OF GENERAL MILITARY REQUIREMENTS.
B. SUMMARY OF PRESENT TECHNOLOGICAL STATUS AND FUTURE SCHEDULE OF
[illegible] PROGRAM, OUTLINING MAJOR DIFFICULTIES AND MILESTONES.
C. SOME EMPHASIS ON COLLECTION, MEMORY AND TRANSMISSION CAPACITIES
FOR EACH SENSOR COMPONENT.
D. SPECIAL EMPHASIS ON PLANNED MEANS FOR PROCESSING INFORMATION
OBTAINED (SUBSYSTEM I).
E. SUMMARY OF ADMINISTRATIVE INTERRELATION-SHIPS BETWEEN ARPA, USAF
AND ITS CONTRACTORS, ARMY AND NAVY.
[illegible] PROJECTOR AND /OR VIEWGRAPH WILL BE AVAILABLE,
IF NEEDED.
BT
[illegible] RJEKMD

"ALL PARAPHRASE [illegible] PRIOR
TO [illegible] RE-
MOVE ALL INTERNAL REFERENCES BY DATE-TIME
GROUP PRIOR TO DECLASSIFICATION."

[illegible] 57-2250

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64

WEAPON SYSTEM 117L PROGRAM STATUS REPORT

For Month Ending 31 August 1958

RCS DD-SD(M) 242

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INTERVALS; [illegible] TICALLY
DECLASSIFIED [illegible] 5200.10

Prepared by
AIR FORCE BALLISTIC MISSILE DIVISION
HEADQUARTERS
AIR RESEARCH AND DEVELOPMENT COMMAND
United States Air Force
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Inglewood, California

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WDPC-58-27

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223

AIR FORCE BALLISTIC MISSILE DIVISION
HEADQUARTERS
AIR RESEARCH AND DEVELOPMENT COMMAND
United States Air Force
Post Office Box 262
Inglewood, California

WDPC

8 September 1958

WEAPON SYSTEM 117L PROGRAM STATUS REPORT
For Month Ending 31 August 1958
RCS DD-SD(M) 242

FOREWORD

This is the fifth report to ARPA on the activities in the Weapon System 117L program. The report summarizes program progress during the month of August and will be consolidated with July and September information for inclusion in a formal quarterly report as of 30 September.

The SENTRY program has progressed satisfactorily and is on schedule.

O. J. Ritland, B/Gen.
B. A. SCHRIEVER
Major General, USAF
Commander

[redacted] ~~CONFIDENTIAL~~

ADVANCED RECONNAISSANCE SYSTEM

GLOSSARY

PROGRAMS

Program I	ATLAS-boosted Engineering Prototype Test
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Program II	Pioneer Visual Reconnaissance Program
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Program VIII	Electronic Surveillance Program

PROPULSION

Booster	ATLAS and THOR Missiles	
ARS	XLR81-Ba-3	15,150-lb thrust engine; pump-fed; 263 lb sec/lb vacuum specific impulse; JP-4/IRFNA
	XLR81-Ba-5	15,150-lb thrust engine; pump-fed; 277 lb sec/lb vacuum specific impulse; UDMH/IRFNA

[redacted] ~~CONFIDENTIAL~~

WEAPON SYSTEM 117L PROGRAM STATUS REPORT
For Month Ending 31 August 1958
RCS DD-SD(M) 242

I. BRIEF OF PROGRESS

Taking advantage of increased rocket thrust, design criteria for the ATLAS-boosted SENTRY vehicle were altered to increase the total vehicle weight from 9,300 pounds to 11,600 pounds and the on-orbit weight from approximately 3,500 pounds to approximately 5,000 pounds.

Preliminary flight rating tests of two XLR81-Be-3 engines were successfully completed.

Ten hot firings were accomplished at the Santa Cruz Test Base using XLR81-Be-3 engine serial #4.

All components of the guidance and flight control subsystem for SENTRY flight vehicle #1 have been received by Lockheed and are undergoing acceptance and checkout tests.

The present configuration of the airborne film processor successfully completed a 24-day continuous life test. Initial tests of additional visual reconnaissance subsystem components were successful.

Detailed plans have been established for recovery of the biomedical package. Biomedical experiments have been scheduled for THOR/SENTRY flights #3, 4, 6, 8 and 10.

Initial installation of launch and blockhouse equipment at Cooke Air Force Base began in August. A detailed schedule for SENTRY activities at Cooke was prepared.

Interim tracking and telemetry facilities are beneficially occupied at Cooke Air Force Base, California; Kaena Point, Oahu, Hawaii; Annette Island, Alaska; and Kodiak Island, Alaska.

[redacted] ~~CONFIDENTIAL~~

II. TOPICAL SUMMARY

A. FLIGHT TEST PROGRAM

1. Preliminary flight rating tests (PFRT) were completed on two XLR81-Be-3 engines. The tests, conducted at the Bell Aircraft Corporation beginning in June, were successful. After test completion, these PFRT engines were disassembled for review by contractor and Air Force personnel. A PFRT report has been prepared.

2. The detailed schedule for equipment installation and operations at the THOR/SENTRY launch complex at Cooke Air Force Base, California, has been prepared. In accordance with this schedule, the initial installation of launch and blockhouse equipment began the week of 18 August. A facility-checkout SENTRY vehicle will be used for installation checkout prior to the arrival of the first SENTRY flight vehicle.

B. SATELLITE AIRFRAME SUBSYSTEM

1. During August, design criteria for the ATLAS-boosted SENTRY vehicle were altered to increase the total vehicle weight and the on-orbit weight. Increases in ATLAS booster performance above that anticipated, together with increased performance of the SENTRY vehicle resulting from change to unsymmetrical di-methyl hydrazine (UDMH) as a fuel, allow an increase in the gross weight of the SENTRY vehicle from 9,300 pounds to 11,600 pounds. The allowable increase in the gross weight of the SENTRY vehicle permits an increase of the on-orbit weight from approximately 3,500 pounds to approximately 5,000 pounds. ATLAS boosters to be used for the SENTRY are being strengthened to carry these higher loads.

2. THOR-boosted flight test vehicles #1 and 2 are undergoing modification and checkout at the Lockheed Missile System Division. See Figures 1 through 8. The propellant tanks in flight test vehicle #1 were removed and a new set was installed. This installation included a fix on the oxidizer feed line to correct failure of a vibration absorbing bellows in the oxidizer feed line under extended vibration tests. The fix involved replacing the aluminum bellows with a steel bellows possessing better vibration characteristics.

C. SATELLITE PROPULSION SUBSYSTEM

Ten hot firings were accomplished at the Santa Cruz Test Base using XLR81-Be-3 engine serial #4. Nine of the hot firings were successful. In the one unsuccessful firing, flameout in the gas generator during start resulted in premature shutdown. The cause of flameout is being investigated. Cold flow testing of the XLR81-Be-3 engine configuration is nearing completion with sixteen propulsion test assembly cold flow tests performed during the month.

D. GUIDANCE AND FLIGHT CONTROL SUBSYSTEM

1. All components of the guidance and flight control subsystem for SENTRY flight vehicle #1 have been received by Lockheed and are undergoing acceptance and checkout tests. No major discrepancies have been found.

2. A number of components for SENTRY flight vehicle #2 have also been received and are undergoing tests. Among these is an attitude damping unit which will be used to control the satellite attitude in orbit. Attitude damping will not be used on flight vehicle #1.

3. A typical ATLAS/SENTRY ascent, illustrating the functions of the guidance and control subsystem, is shown in Figure 9.

E. VISUAL RECONNAISSANCE SUBSYSTEM

1. The present configuration of the airborne film processor has successfully completed a 24-day continuous life test at the Eastman Kodak Company. This design is presently planned for the first visual flights. It is a pre-soaked web processor type which carries a monobath developer solution on the web material. The web is brought into contact with the exposed film and processing takes place while the two are in contact. The processor does not require solution storage tanks, valves, or plumbing and gives promise of being a highly reliable item. During the 24-day unattended test, photographic quality was maintained at an acceptable level.

2. The first model of the high-speed 35 mm processor for the ground station has been delivered and is being readied for testing. A development model of the film readout equipment built by the Columbia Broadcasting System for Eastman Kodak is undergoing tests at the Eastman Kodak Company. Initial tests of these equipments have been successful; however, considerable equipment "debugging" is necessary. A simulated air photo mosaic of the SENTRY visual reconnaissance system using a six-inch focal length lens is shown in Figure 10.

F. BIOMEDICAL SUBSYSTEM

1. Detailed plans have been established for recovery of the biomedical capsule. The recovery phase will operate in the following manner. On the seventeenth pass over Alaska, a ground signal to the satellite programmer will command the satellite (orbiting in a horizontal nose-first attitude) to pitch down on the eighteenth pass. The biomedical recovery capsule is then separated from the SENTRY satellite. A set of two spin rockets is fired and the biomedical recovery package is spun at approximately 60 rpm for stabilization. The retro-rocket is then fired. After the retro-rocket is fired, a set of two additional spin rockets is

Rec

fired to counteract the original rotation, and the biomedical recovery capsule is permitted to right itself aerodynamically. The retro-rocket and spin rockets are jettisoned simultaneously after burnout. During reentry into the atmosphere, the biomedical capsule is protected by ablative material. At approximately 50,000 feet a radar reflective parachute is opened. The remainder of the ablative material is jettisoned and chaff is released. A radio beacon of greater than 50-mile range and a flashing light, visible for 10 miles during the day and 50 miles at night, is turned on. Lockheed RC-121 (Constellation) radar aircraft track the descending package and guide Fairchild C-119 aircraft to the recovery point. Recovery is made by the C-119 at or below approximately 10,000 feet by means of a cable loop with hooks which snag the parachute canopy, after which a winch will draw the collapsed parachute and capsule into the aircraft. In the event that air recovery is not successful, surface vessels will provide backup for water recovery.

2. An over-all recovery program test plan has been prepared. Rec Tests will be performed with weights simulating the recovery capsule. Radar reflective parachutes and chaff will be tracked by the radar of the RC-121 aircraft. Full scale air and water recovery tests will be conducted with the simulated capsule carrying flashing lights and radio beacons. Biomedical experiments have been established for THOR/SENTRY flights #3, 4, 6, 8, and 10.

G. GEOPHYSICAL ENVIRONMENT

The Air Force Cambridge Research Center (ARDC) is performing geophysical environment subsystem investigations for the SENTRY satellite, utilizing rockets to test instrumentation to be flown in the early vehicles, and at the same time, obtaining geophysical and environmental design criteria for SENTRY. To date, eight Aerobee and two Nike-Cajun rockets instrumented by the Geophysics Research Directorate of the Cambridge Research Center, have been launched at the Air Force Missile Development Center, New Mexico. Six of these rockets were successful; the other four encountered rocket failure. In addition to proving out instrumentation techniques for SENTRY, information on the intensity of solar ultra-violet radiation and spatial density of micrometeorite particles was obtained. All this information is important in establishing SENTRY environmental design criteria.

H. FACILITIES AND SITES

1. Launch Facilities

a. Final designs of the launch complex and the missile assembly building at Cooke Air Force Base are underway. Completion of the plans and specifications is scheduled for 31 October. The contract construction award will be made in December.

b. Construction of the launch stand for the first SENTRY THOR-boosted firing at Cooke Air Force Base has been completed. Equipping of the facility is underway.

c. Modification of the launch stand for the low latitude test firings of the SENTRY from the Air Force Missile Test Center (AFMTC), Florida, started during August.

d. Firm requirements for modification of Assembly Building "E" at AFMTC have been established and design has been started.

2. Tracking, Control, Telemetry and Data Acquisition Facilities

a. Locations of tracking and control stations for THOR/SENTRY flights are shown in Figure 11.

b. Interim tracking and telemetry facilities at Cooke Air Force Base are now ready for beneficial occupancy. Although no actual equipping has started, equipment is being moved from the factories to the site at the present time. Design of the permanent test tracking facility is complete except for the data acquisition and processing building. Review of preliminary plans for the data acquisition and processing building is underway.

c. Interim tracking and telemetry facilities at Kaena Point, Oahu Island, Hawaii, are now beneficially occupied and equipping has started. Plans and specifications have been released for construction of the permanent tracking station.

d. Tracking and telemetry facilities at Annette Island, Alaska, and at Cape Chiniak, Kodiak Island, Alaska, are now beneficially occupied.

e. The Air Force Ballistic Missiles Committee has formally approved the selection of New Boston Bombing Range, Grenier Air Force Base, New Hampshire, as the site of the Northeast tracking and data acquisition station. Final design of this facility will start about 20 October.

f. Design of the Northwest tracking and data acquisition station at Fort Stevens, Tongue Point, Oregon, has started and is progressing satisfactorily.

g. The recommendation of the site selection board to use the deactivated Naval Air Station at Ottumwa, Iowa, as the location of the Central tracking and data acquisition station was referred to Headquarters USAF for approval.

230

Figures 1 through 8. SENTRY vehicles in various stages of assembly and inspection on the assembly line at the Lockheed Missile System Division.

(WDPC-58-27)

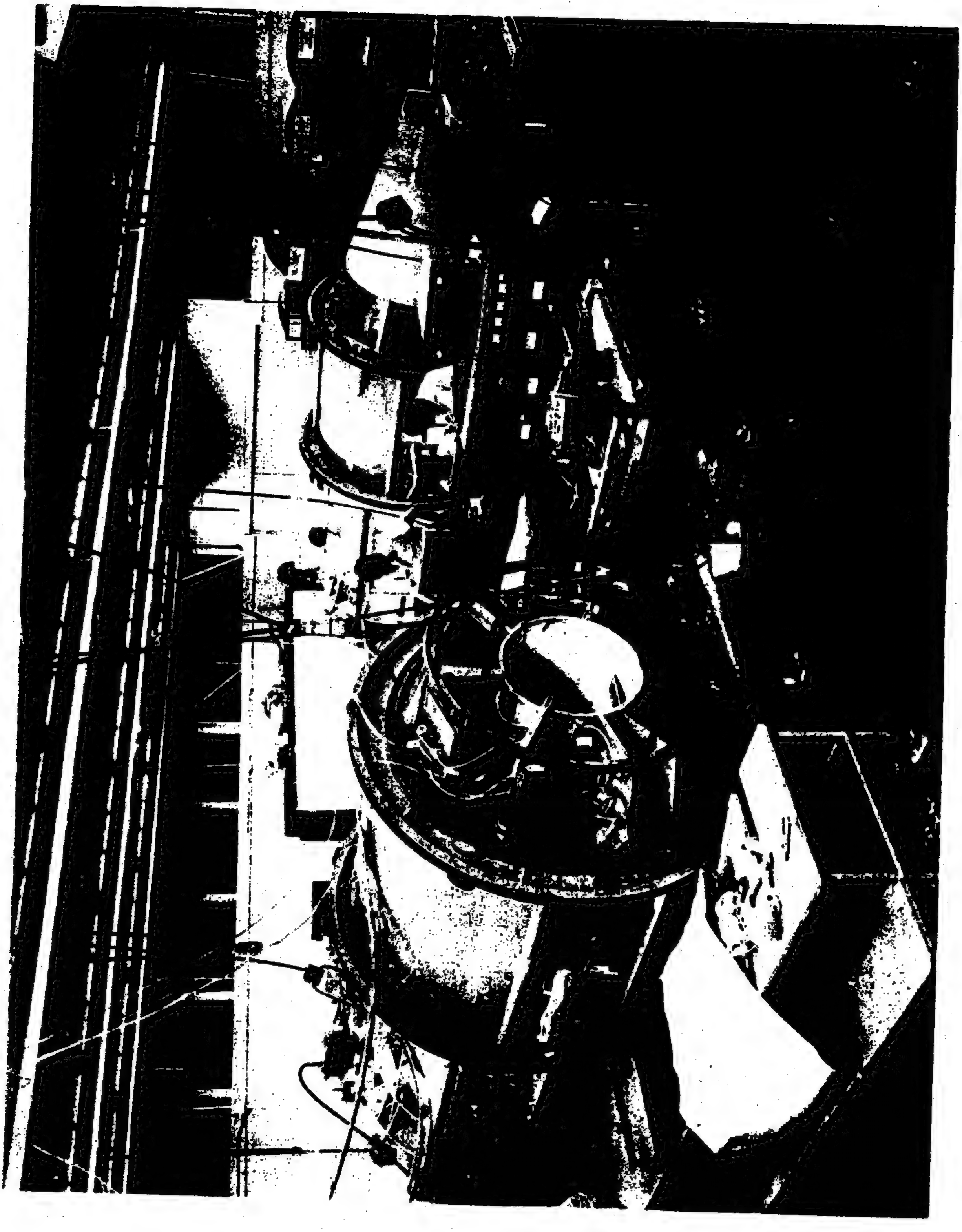

Figure 2

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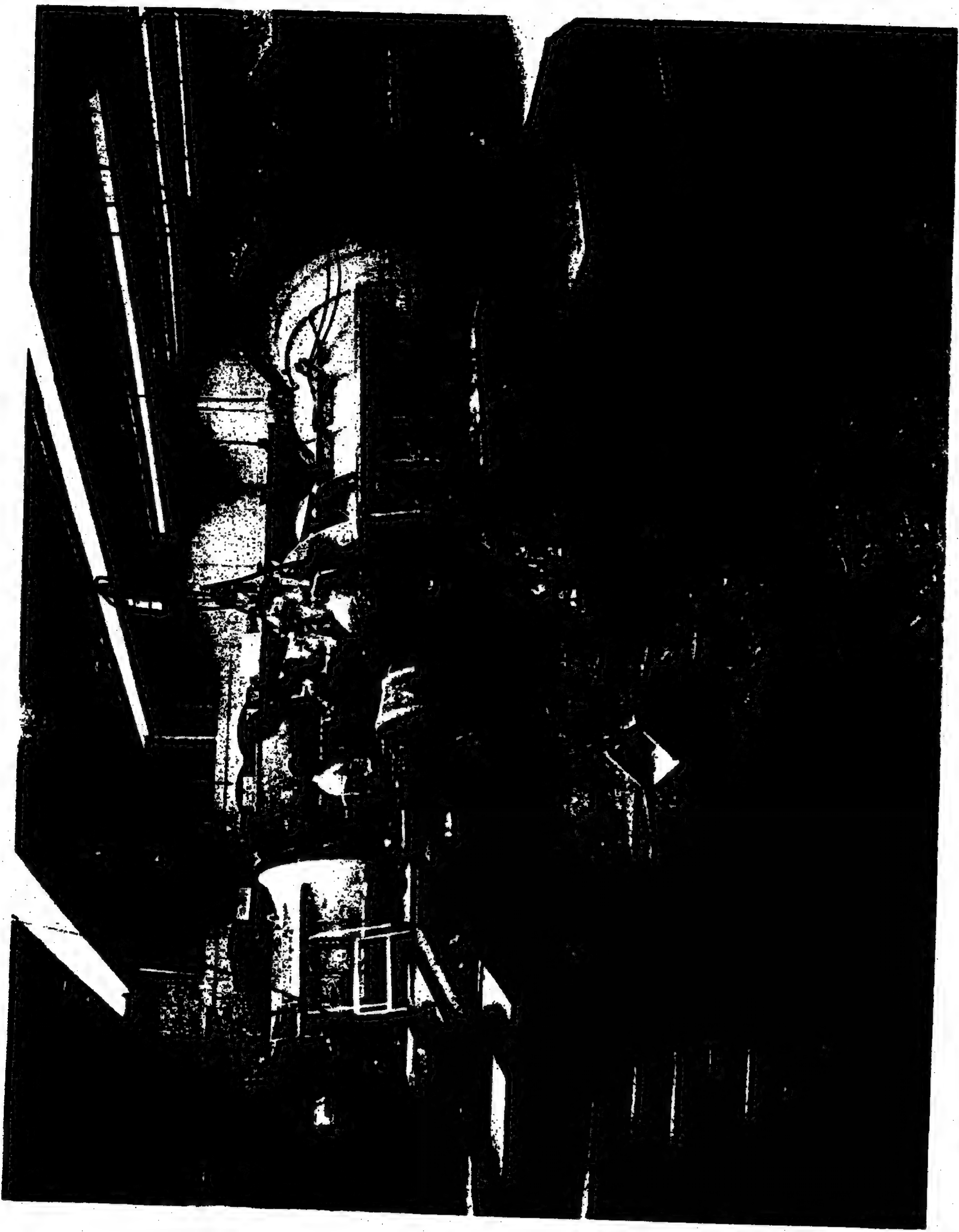

Figure 3

(WDPC-58-27)

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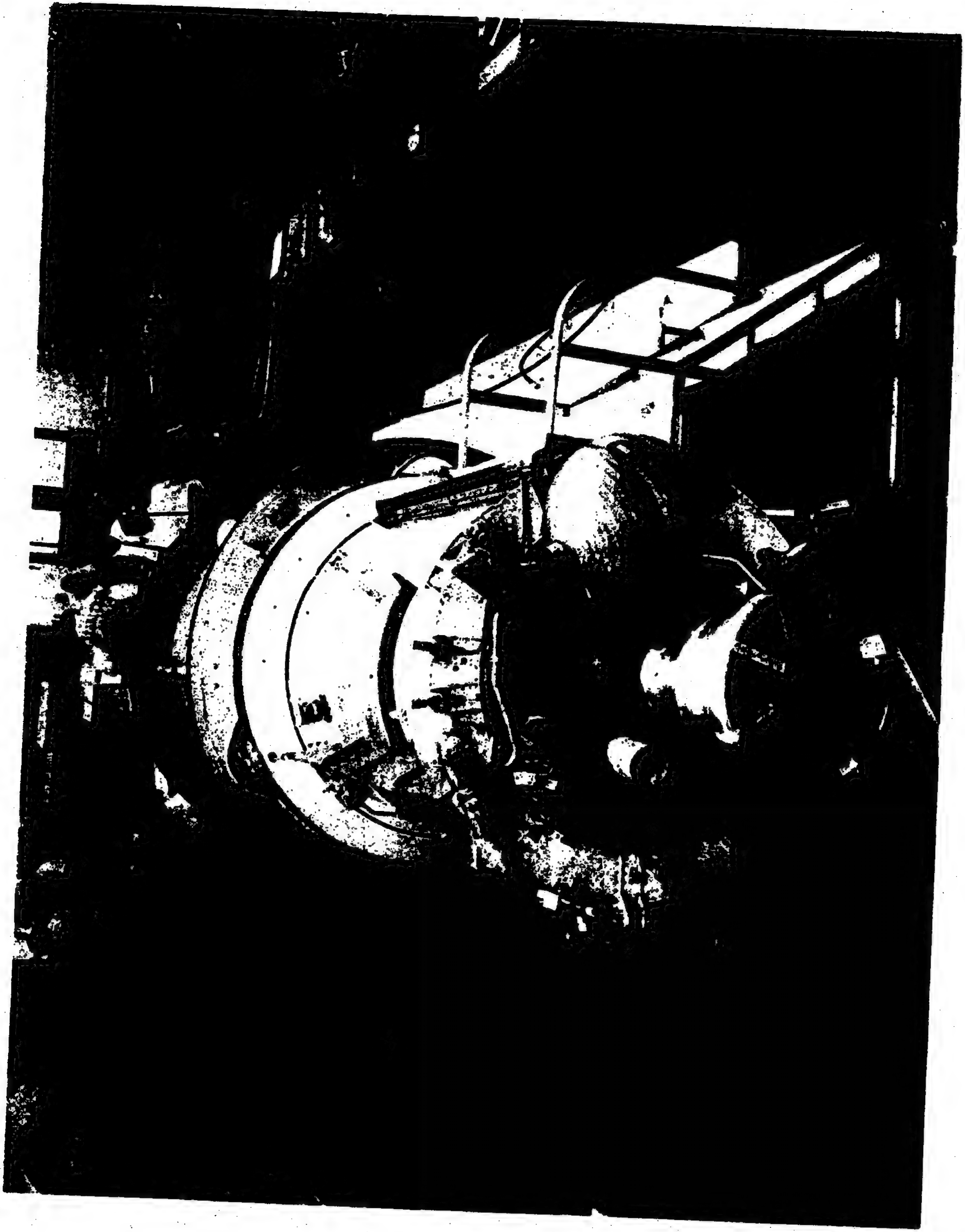

Figure 4

(WDPC-58-27)

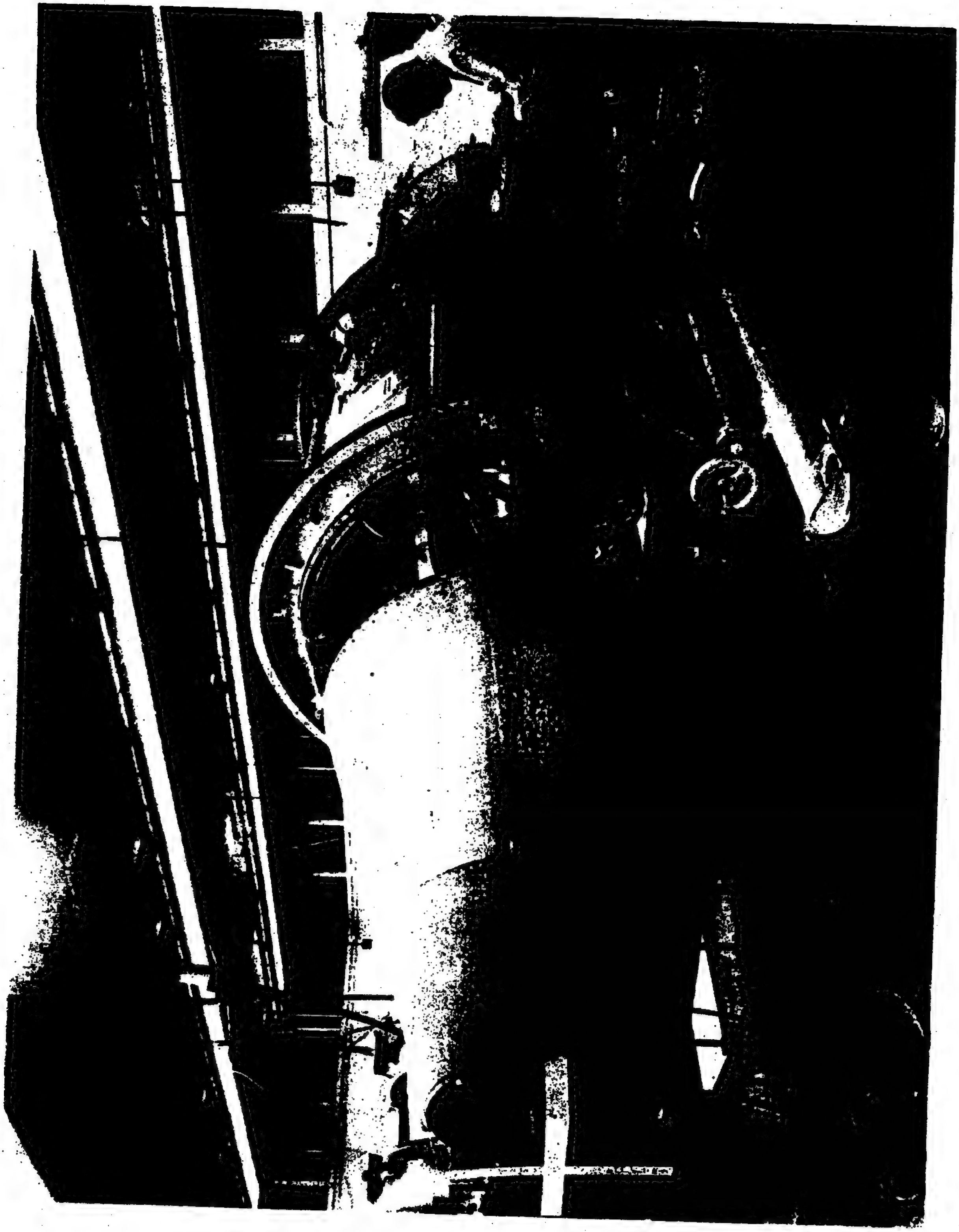

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Figure 5

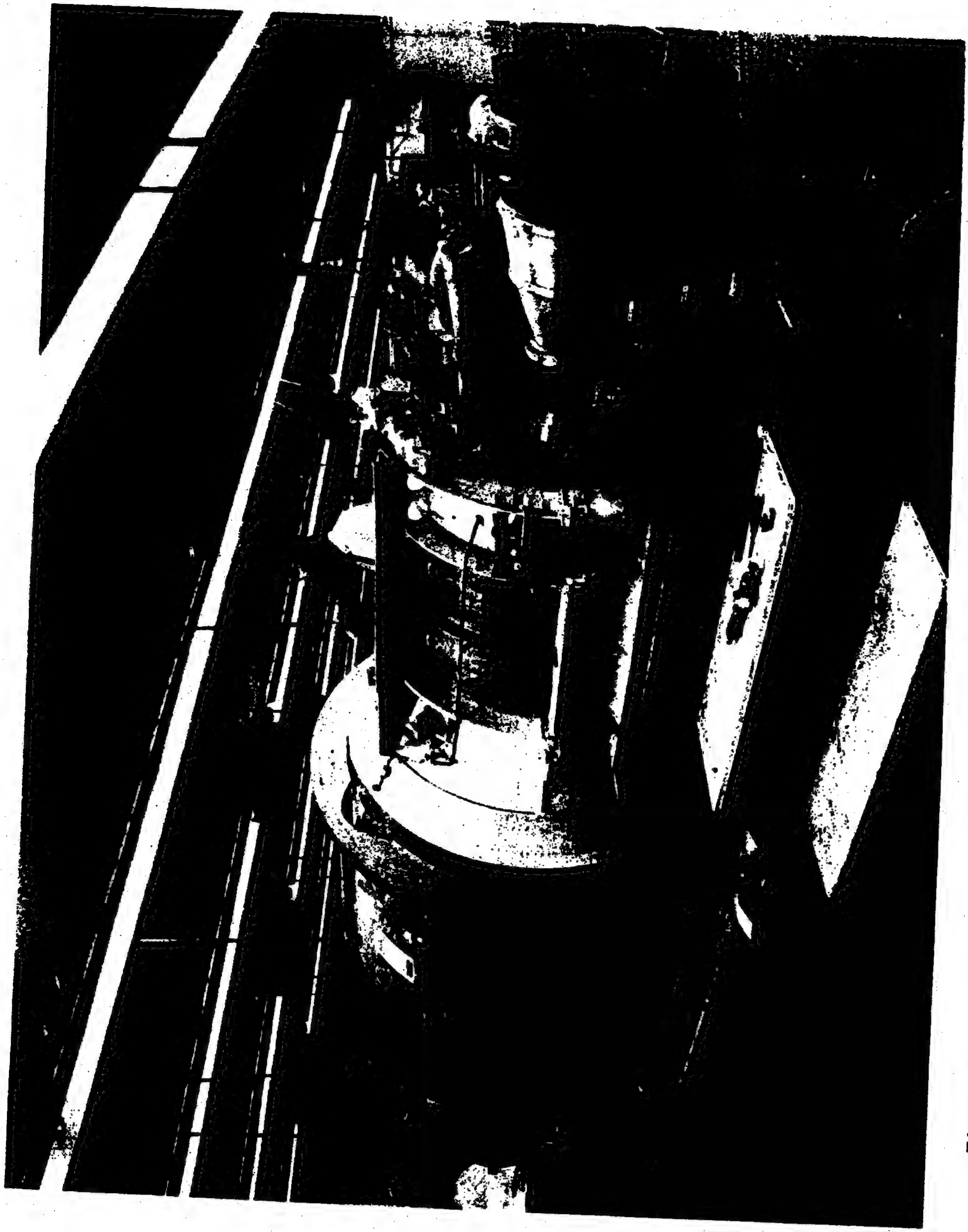

Figure 6

(WDPC-58-27)

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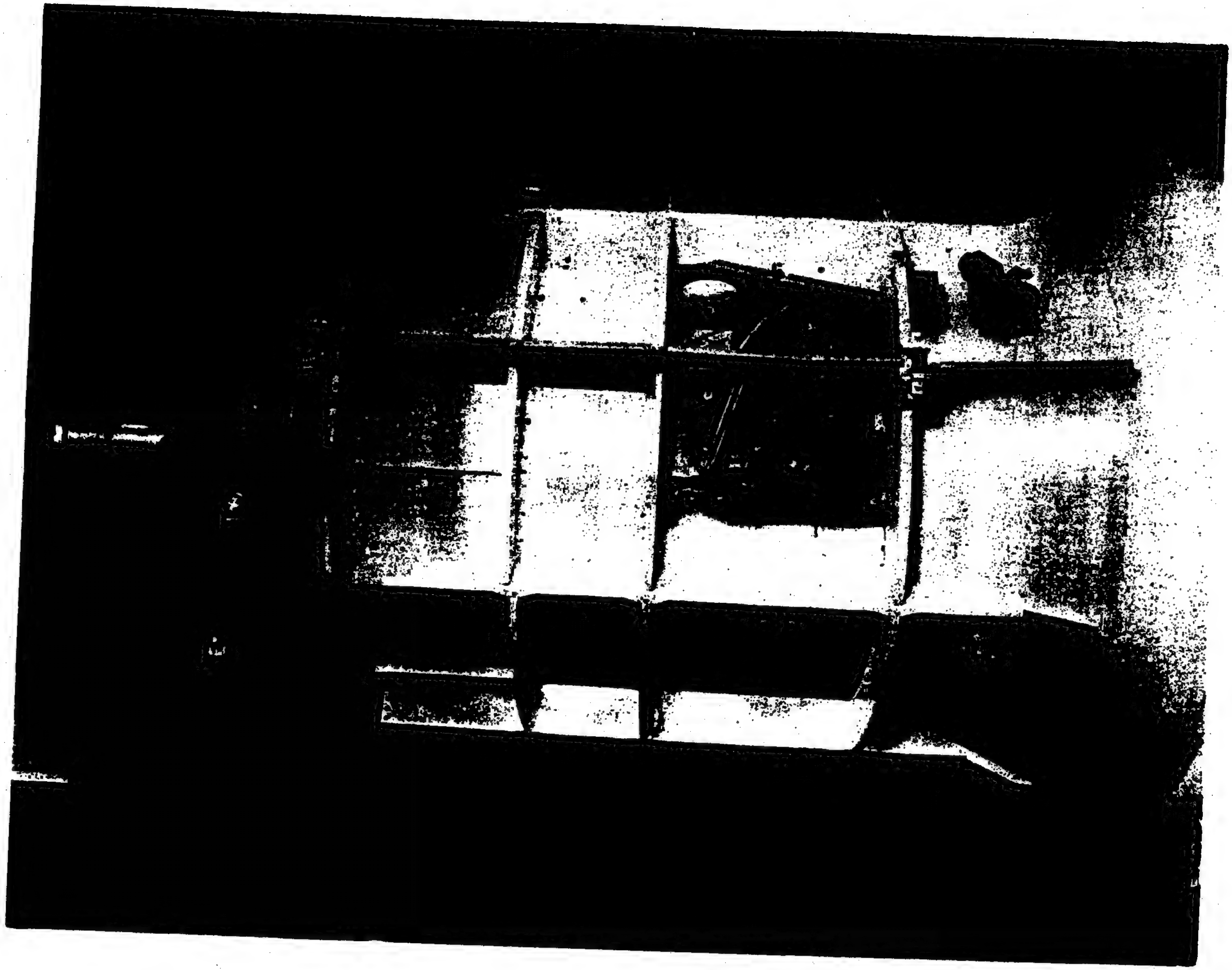

Figure 7

(WDPC-58-27)

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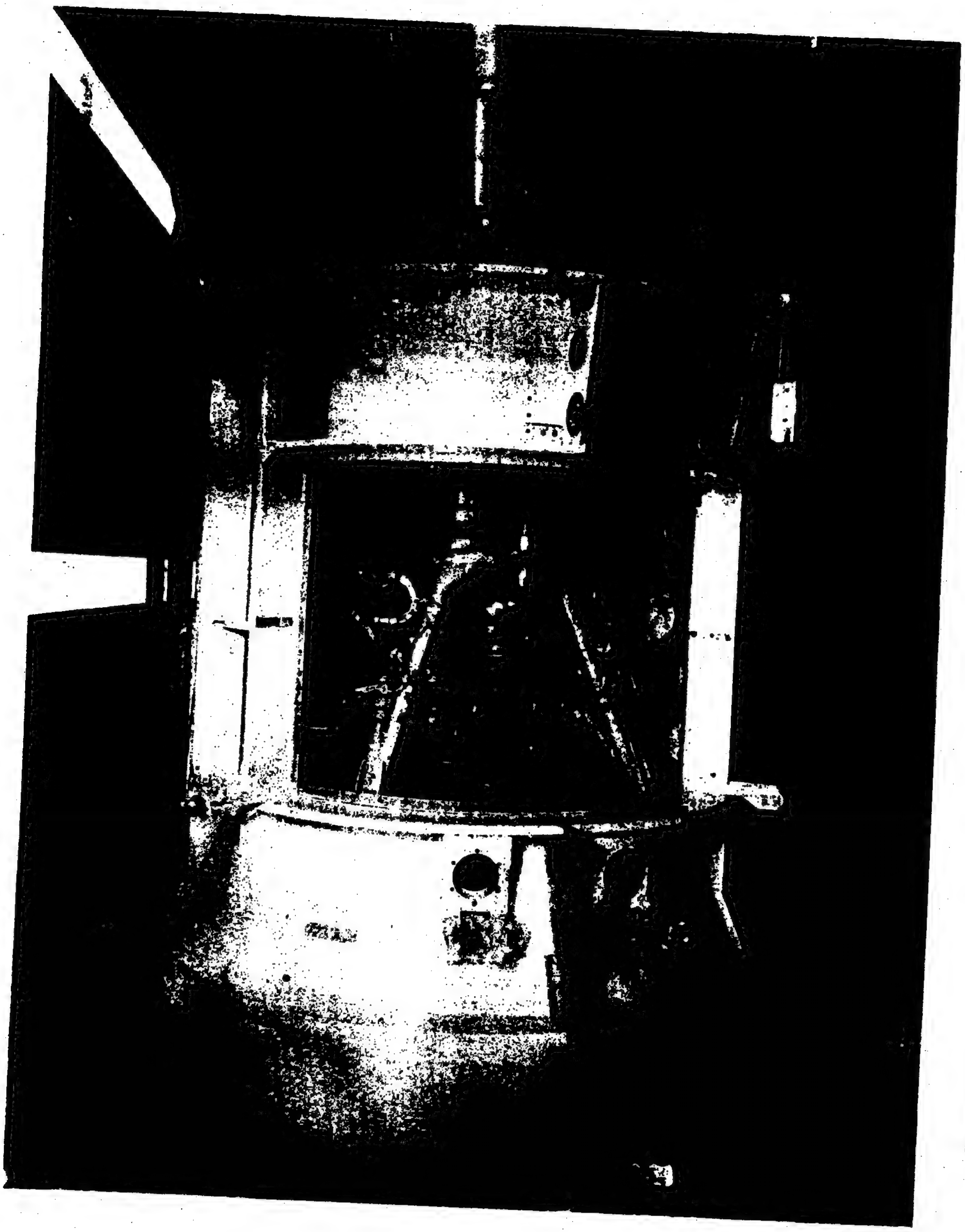

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Figure 8

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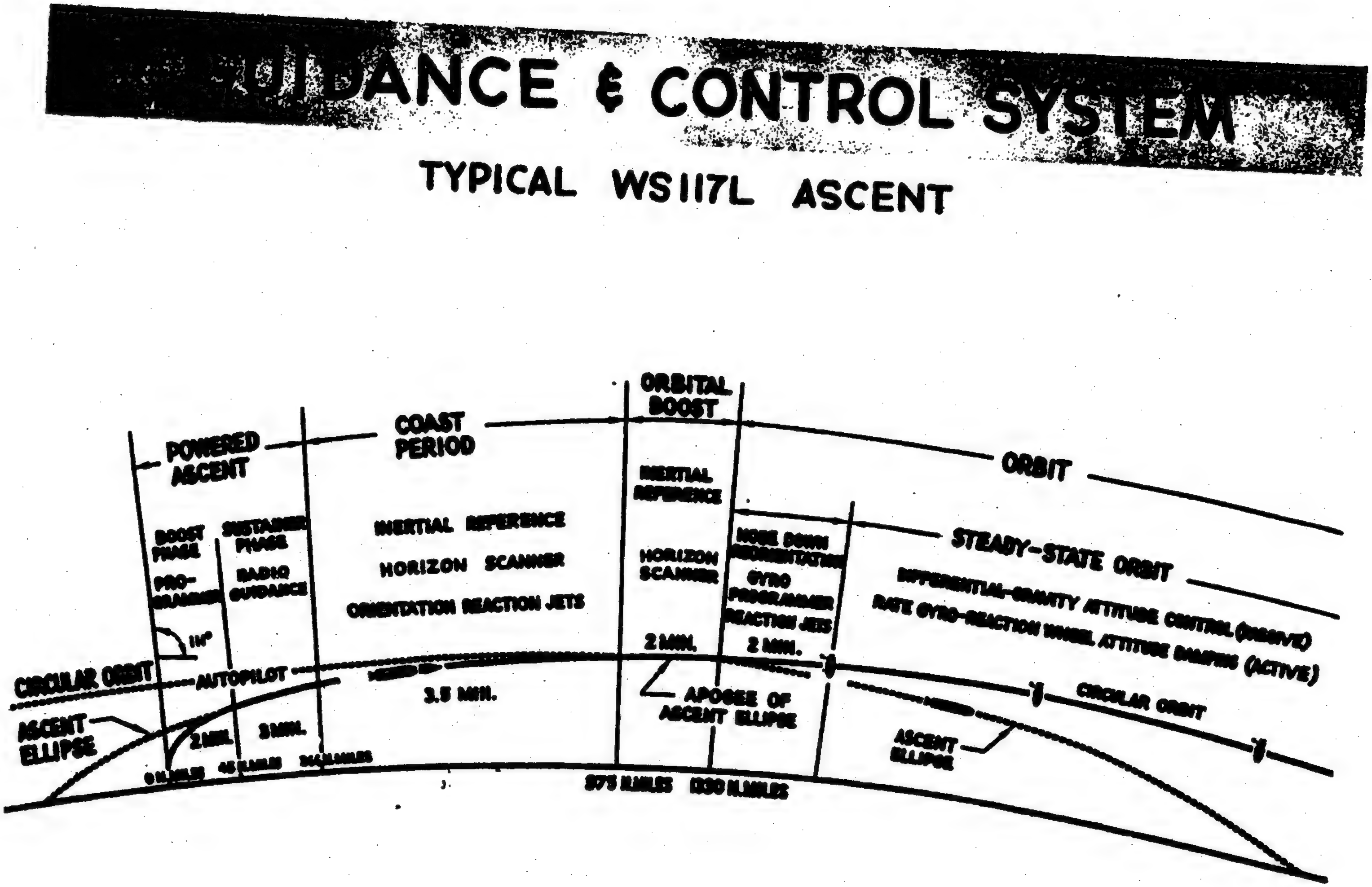

Figure 9. Typical ATLAS/SENTRY ascent illustrating functions of the guidance and control subsystems.

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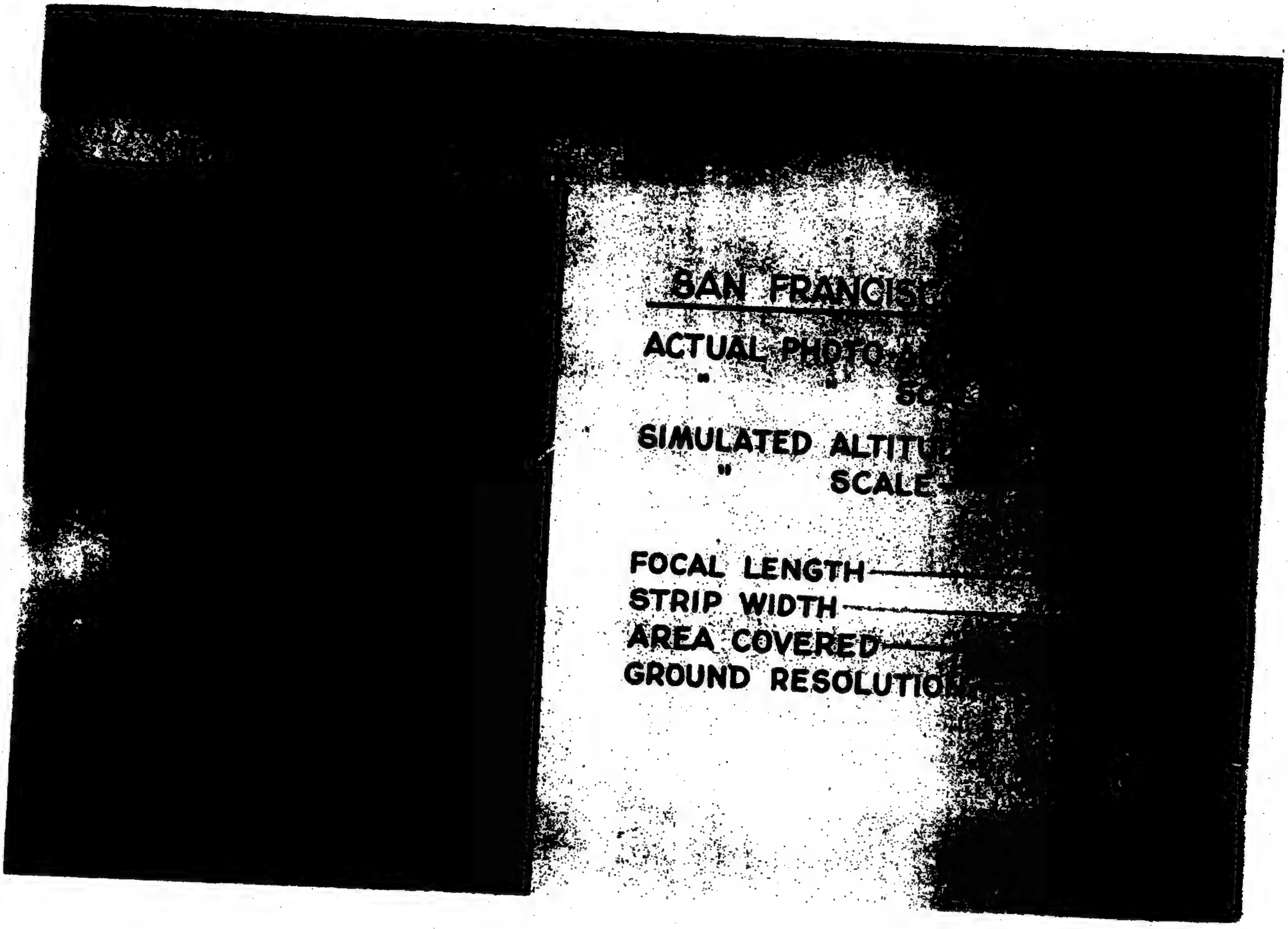

Figure 10. SENTRY Visual Reconnaissance System simulated air photo mosaic.

(WDPC-58-27)

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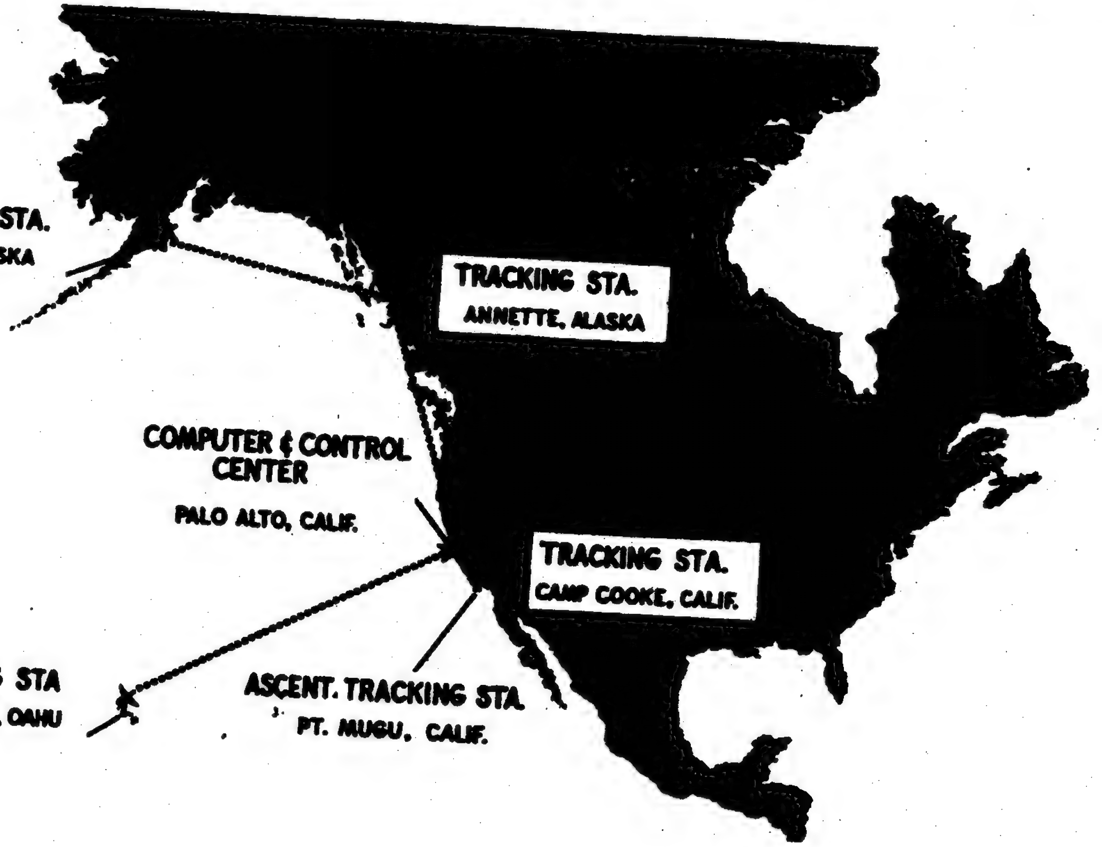

Figure 11. Locations of tracking and control stations for THOR-boosted SENTRY vehicles.
(WDPC-58-27)

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Assistant CINCSAC (SAC MIKE)	10

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WDGO

MEMORANDUM FOR GENERAL LARGE

12 SEP 1958

SUBJECT: Changes in WS-117L Schedules

1. I am aware that General Power has sent a request to the Chief of Staff containing proposed operational dates for WS-117L based upon R&D schedules submitted by AFBMD in the Advanced Reconnaissance System (WS-117L) Development Plan, dated 15 March 1958.

242

2. Subsequent to March 1958, a budget ceiling of $215 M was established for the WS-117L program during FY 1959. This fund limitation has necessitated the cancellation of flights and reprogramming of other necessary R&D so that the earliest date on which operational flights under the supervision of SAC could be accomplished is approximately November 1961. This date estimate is based upon a tentative program not yet submitted. At this time the continuing effort being applied to this reprogramming problem indicates that even the November 1961 date is infirm and may well slip farther into the future.

3. We expect to finalize a new development plan for submission about the end of September - at which time I am sure that the operational portion of this new development plan must be drawn up with operational program dates properly in step with R&D capabilities. This being the case I suggest that some SAC/MIKE action may be necessary in connection with General Power's letter which proposes a program not now within our real capabilities.

ORIGINAL SIGNED:
B. A. SCHRIEVER

B. A. SCHRIEVER
Major General, USAF
Commander

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TO RJWZBK/COMAFBMD ARDC INGLEWOOD CALIF
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BT

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LX~~S E C R E T/~~ FM RDZGA9-13-E - FOLOWING IS SPACE ACTIVITY DAILY FOR 16 SEP 58. SUBJECT SPACE ACTIVITY DAILY

BY MEMORANDUM, DATED 10 SEPTEMBER 1958, ARPA ADVISES THAT THEY WISH TO SEPAGATE AND ASSIGN DIFFERENT TERMINOLOGY TO THE SEVERAL PROGRAMS BEING CONDUCTED UNDER WS-117L /ADVANCED RECONNAISSANCE SUSTEM/ FOR BUDGET JUSTIFICATION AND PROGRAM MANAGEMENT PURPOSES. ARPA REQUEST TATHE TERWS-117L BE ABANDONED AND THE NAME SENTRY BE APPLIED ONLY TO THOSE OPERATIONAL CAPABILITIES PREVIOUSLY DESIGNATED AS PIONEER VISUAL /PROGRAM II/ AD PIONEER FERRET /PROGRAM III[redacted]/ALL OTHER ITEMS WILL BE BUDGETED NOT AS SYSTEMS, BUT AS SUB-SYSTEMS AND/ OR COMPONENTS. THE ABOVE CHANGES ARE TO BE FULLY EFFECTIVE BY FY 1960.

/S S E C R E T /
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WDTSR

26 Sep 1958

SUBJECT: (U) Release of WS 117L Information to Foreign Nationals

TO: Assistant Chief of Staff, Intelligence
Headquarters, USAF
Washington 25, D. C.

1. References:

a. Headquarters USAF letter to the Air Force Ballistic Missile Division, "Change of Visitor Control Procedures and WS 107A, WS 117L and WS 315A Projects", dated 29 July 1958; and 1st Indorsement to Hq USAF dated 8 August 1958.

b. Hq USAF message AFCIN 46741 to AFPR, Lockheed Aircraft Corporation, dated 11 August 1958.

2. The correspondence listed above relates to approval by AFCIN of visits to WS 117L contractors by Foreign Nationals. The first instance concerns Massachusetts Institute of Technology; the second, Lockheed Aircraft Corporation. In each case, the Air Force Ballistic Missile Division questioned the visit authorization because of the unusual sensitivity of some aspects of WS 117L.

3. These two examples may indicate a misunderstanding on our part. Although WS 117L is not explicitly covered in the AF-DCMI 1956, we have assumed that a very restrictive interpretation would be appropriate and would be in keeping with the present security measures for the program. We assume that the problems raised in connection with the releasibility of classified information pertaining to Space Weapons will make necessary a revision of the AF-DCMI to include specific policy on this subject. In the meantime, we would appreciate your guidance on the release of WS 117L information to Foreign Nationals.

FOR THE COMMANDER:

(signed)

J. L. HAMILTON
Colonel, USAF
Executive Officer

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WEAPON SYSTEM 117L PROGRAM STATUS REPORT

Quarter Ending 30 September 1958

RCS DD-SD(M) 242

Prepared by
AIR FORCE BALLISTIC MISSILE DIVISION
HEADQUARTERS
AIR RESEARCH AND DEVELOPMENT COMMAND
United States Air Force
Post Office Box 262
Inglewood, California

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AIR FORCE BALLISTIC MISSILE DIVISION
HEADQUARTERS
AIR RESEARCH AND DEVELOPMENT COMMAND
United States Air Force
Post Office Box 262
Inglewood, California

WDPCR

8 October 1958

WEAPON SYSTEM 117L PROGRAM STATUS REPORT
Quarter Ending 30 September 1958
RCS DD-SD(M) 242

FOREWORD

This report summarizes the progress made in the Advanced Reconnaissance System program during the period 1 July through 30 September 1958.

O. J. Ritland B/Gen.
for
B. A. SCHRIEVER
Major General, USAF
Commander

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ADVANCED RECONNAISSANCE SYSTEM

GLOSSARY

PROGRAMS

Program I	ATLAS-boosted Engineering Prototype Test
Program IIA	Engineering Test and Biomedical Program
Program II	Pioneer Visual Reconnaissance Program
Program III	Pioneer Electronic Reconnaissance Program
Program IV	Advanced Visual Reconnaissance Program
Program V	Advanced Electronic Reconnaissance Program
Program VI	Visual Surveillance Program
Program VII	Infrared Surveillance Program
Program VIII	Electronic Surveillance Program

PROPULSION

Booster	ATLAS and THOR Missiles	
ARS	XLR81-Be-3	15,150-lb thrust engine; pump-fed; 263 lb sec/lb vacuum specific impulse; JP-4/IRFNA
	XLR81-Be-5	15,150-lb thrust engine; pump-fed; 277 lb sec/lb vacuum specific impulse; UDMH/IRFNA

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WEAPON SYSTEM 117L PROGRAM STATUS REPORT
Quarter Ending 30 September 1958
RCS DD-SD(M) 242

I. BRIEF OF PROGRESS

Final design of the first two SENTRY/THOR flight test vehicles is complete, and equipment installation design is underway on the others. Preparations for launch of SENTRY/THOR #1 from Vandenberg (previously Cooke) Air Force Base are underway, with launch scheduled for 6 December. The first flight test vehicle has been delivered by Lockheed to the Santa Cruz test base where it will undergo hot firings in October before its shipment to Vandenberg.

SENTRY/ATLAS design criteria has been altered to increase total vehicle weight and on-orbit weight. A change in the type fuel to be used in SENTRY/ATLAS has resulted in performance increase allowing a gross weight increase from 9,300 to 11,600 pounds and an on-orbit weight increase from approximately 3,500 to approximately 5,000 pounds.

All SENTRY/THOR XLR81-Be-3 engines have been completed, acceptance tested, and delivered to the Lockheed Missile Systems Division by Bell Aircraft Corporation. Propulsion systems scheduled for the first two SENTRY/THOR flight test vehicles underwent hot firings at Lockheed, and engine serial #4 was subjected to ten hot firings at the Santa Cruz test base (Figure 1). Cold flow testing of this engine configuration is nearing completion.

A prototype unsymmetrical di-methyl hydrazine (UDMH) engine underwent two full firings with performance within specifications, resulting in final assembly and delivery of the first UDMH engine to Lockheed.

All subsystem development proceeded as scheduled. All components of the auxiliary power subsystem for SENTRY/THOR #1 were received and acceptance tested by Lockheed. Some problems have been experienced in the 2000 cycle and 400 cycle static inverters. A 400-cycle rotary inverter will be used in SENTRY/THOR #1. Lockheed also received and tested all components of the guidance and control sybsystem for SENTRY/THOR #1 and a number of components of this subsystem for SENTRY/THOR #2. Equipment development for the biomedical program is on schedule. The Air Force School of Aviation Medicine is acting as consultant to Lockheed on biomedical aspects of capsule design and will supply and train test animals for this program. Detailed plans were established for reentry from orbit and recovery of the biomedical package; an air recovery test program is underway.

Facility design of the SENTRY/ATLAS launch complex at Vandenberg Air Force Base is scheduled for completion on 15 November. Interim tracking and telemetry facilities were beneficially occupied at Vandenberg Air Force Base, California; Naval Air Missile Test Center, Point Mugu, California; Kaena Point, Oahu, Hawaii; Annette Island, Alaska; and Kodiak Island, Alaska. Design of the Northwest tracking and data acquisition station is scheduled for completion in October; the architect-engineer for design of the Northeast station was selected in September. Siting of the Central station at the former Naval Air Station, Ottuwa, Iowa, was approved.

II. TOPICAL SUMMARY

A. FLIGHT TEST PROGRAM

1. Progress on the SENTRY flight test program during the quarterly period 1 July through 30 September included determination of flight test objectives for all SENTRY/THOR flights.

2. A detailed test plan for the first SENTRY flight was prepared. Minor rescheduling has changed the launch date to 6 December, two weeks later than originally planned. The overall SENTRY program will not be affected.

3. Modification and checkout operations on the first THOR-boosted flight test vehicles were completed at Lockheed Missile Systems Division during September. The vehicle was shipped from the Lockheed plant at Palo Alto to the Hazard test base at Santa Cruz where it will undergo two hot firing tests prior to October shipment to the launch site at Vandenberg Air Force Base.

4. Installation of launch and blockhouse equipment began the week of 18 August in accordance with the schedule established for equipment installation and operations at the SENTRY/THOR launch complex at Vandenberg. A facility-checkout vehicle is being used for installation checkout pending the arrival of the first SENTRY flight vehicle.

B. SATELLITE AIRFRAME SUBSYSTEM

1. Final design of the first two SENTRY/THOR flight vehicles was completed, and equipment installation design was underway on the remaining vehicles. SENTRY/THORs #1 and #2 underwent modification and checkout at the Lockheed Missile Systems Division, where the spun aluminum tanks were replaced in SENTRY/THOR #1. The installation included a fix on the oxidizer feed line to correct failure of a vibration absorbing bellows under extended vibration tests. The aluminum bellows was replaced with a steel bellows possessing better vibration characteristics. SENTRY/THOR #1 completed modification and checkout operations in September; SENTRY/THOR #2 checkout is still underway. (Figures 2, 3, and 4)

2. Design criteria for ATLAS-boosted SENTRY vehicles was altered to increase the total vehicle weight and on-orbit weight. Increases in ATLAS booster performance above that anticipated and increased performance of the SENTRY vehicle resulting from use of unsymmetrical di-methyl hydrazine (UDMH) as a fuel allowed an increase in the gross weight of the SENTRY vehicle from 9,300 to 11,600 pounds. The allowable increase in the gross weight of

the SENTRY vehicle permits an increase of the on-orbit weight from approximately 3,500 to 5,000 pounds. ATLAS boosters to be used with SENTRY vehicles are being strengthened to carry these higher loads.

3. Early in the planning of the SENTRY program, a decision was made to fabricate two propulsion test vehicle assemblies (PTVA) to provide a test vehicle backup. The soundness of this decision was demonstrated during September, when two failures occurred in PTVA units. The first failure involved the explosion of a high pressure helium sphere on the third hot firing of the unit. This sphere was constructed of laminated fiberglas and had previously been subjected to two hot-firing cycles without incident. Fiberglas spheres were used as an interim measure pending completion of titanium spheres which will be used on the final vehicles. Damage resulting from the explosion was minor, and the PTVA was repaired for resumption of the PTVA test program. The second failure occurred in the second PTVA on 19 September when an explosion and burning of the engine damaged the unit beyond repair. Only minor damage was sustained by the test stand and repairs are underway. An evaluation of cause for the failure has not been completed. Another vehicle is being assembled using spare components.

C. SATELLITE PROPULSION SYSTEM

1. Preliminary flight rating tests on two XLR81-Be-3 engines were successfully completed by the Bell Aircraft Corporation. Following the tests, the engines were disassembled for review by contractor and Air Force personnel.

2. Hot firings were conducted on engines delivered to Lockheed Missile Systems Division by the Bell Aircraft Corporation for installation in SENTRY/THORs #1 and #2.

3. Ten hot firings were accomplished at the Santa Cruz test base using XLR81-Be-3 engine serial #4. Nine of the hot firings were successful; in the one unsuccessful firing, flameout in the gas generator during start caused premature shutdown.

4. Cold flow testing of the XLR81-Be-3 engine configuration neared completion.

5. Two full-duration firings of the prototype unsymmetrical di-methyl hydrazine (UDMH) engine during September gave evidence that engine performance was within specifications. As a result, assembly operations were completed on the first UDMH flight engine and the engine was delivered to the Lockheed Missile Systems Division.

6. All XLR81-Be-3 engines to be used in the SENTRY/THOR program have been completed, acceptance tested, and delivered to Lockheed by the Bell Aircraft Corporation. Performance of all engines was well within specification requirements.

D. AUXILIARY POWER SUBSYSTEM

1. All components for the auxiliary power subsystem of the first SENTRY/THOR flight vehicle have been delivered to Lockheed and subjected to acceptance testing. Some difficulty has been experienced with the 2000-cycle and 400-cycle static inverters. A 400-cycle rotary inverter has been installed in SENTRY/THOR #1.

2. Plans for SENTRY/ATLAS solar battery tests in connection with the ATLAS-boosted engineering prototype testing program are proceeding satisfactorily.

E. GUIDANCE AND CONTROL SUBSYSTEM

1. All aspects of the guidance and control subsystem for the THOR-boosted SENTRY program are on schedule. Figure 5 depicts a typical launch-to-orbit of the SENTRY vehicle. Figure 6 outlines the typical ground trace of the satellite when launched on an 183 degree orbit.

2. All components of the guidance and flight control subsystem for SENTRY/THOR #1, and a number of components for SENTRY/THOR #2, were received by Lockheed and subjected to acceptance and checkout testing. An attitude damping unit for controlling the satellite in orbit will be used for the first time on SENTRY/THOR #2.

F. SATELLITE COMMUNICATIONS SUBSYSTEM

Deliveries of major items of equipment for the communications subsystem are on schedule. Equipment is being delivered to telemetry sites and tracking and acquisition stations. Shakedown tests of the downrange telemetry ship to be used in the launch program at Vandenberg Air Force Base are scheduled for October. A 60-word-per-minute teletype communications check of the ground communications system is also scheduled for October.

G. BIOMEDICAL RECOVERY PROGRAM

1. All biomedical equipment development is on schedule. A Rec mockup of the biomedical recovery capsule has been completed (Figure 7); the first biomedical recovery capsule is scheduled for delivery by General

Electric in October. The Air Force School of Aviation Medicine is acting as technical consultant to the Lockheed Aircraft Corporation on all biomedical aspects of the capsule design and will supply and train test animals to be used in the program.

2. An air recovery test program is underway, and detailed plans have been established for recovery of the biomedical package. Figure 8 is an artist's conception of the biomedical recovery system which will operate in the following manner. On the seventeenth pass over Alaska, a ground signal to the satellite programmer will command the satellite (orbiting in a horizontal nose-first attitude) to pitch down on the eighteenth pass. The biomedical recovery capsule is then separated from the SENTRY satellite. A set of two spin rockets is fired and the biomedical recovery package is spun at approximately 60 rpm for stabilization. The retro-rocket is then fired. After the retro-rocket is fired, a set of two additional spin rockets is fired to counteract the original rotation, and the biomedical recovery capsule is permitted to right itself aerodynamically. The retro-rocket and spin rockets are jettisoned simultaneously after burnout. During reentry into the atmosphere, the biomedical capsule is protected by ablative material. At approximately 50,000 feet a radar reflective parachute is opened. The remainder of the ablative material is jettisoned and chaff is released. A radio beacon of greater than 50-mile range and a flashing light, visible for 10 miles during the day and 50 miles at night, are turned on. Lockheed RC-121 (Constellation) radar aircraft track the descending package and guide Fairchild C-119 aircraft to the recovery point. Recovery is made by the C-119 at or below approximately 10,000 feet by means of a cable loop with hooks which snag the parachute canopy, after which a winch will draw the collapsed parachute and capsule into the aircraft. In the event that air recovery is not successful, surface vessels will provide backup for water recovery.

3. An overall recovery program test plan has been prepared. Tests will be performed with weights simulating the recovery capsule. Radar reflective parachutes and chaff will be tracked by the radar of the RC-121 aircraft. Full scale air and water recovery tests will be conducted with the simulated capsule carrying flashing lights and radio beacons. Biomedical experiments have been established for SENTRY/THOR flights #3, 4, 7, 10, and 14.

H. GEOPHYSICAL ENVIRONMENT

The Air Force Cambridge Research Center (ARDC) is performing geophysical environment subsystem investigations for the SENTRY satellite to test instrumentation to be flown in early vehicles and to obtain geophysical and environmental design criteria for SENTRY.

I. FACILITIES AND SITES

1. Launch Facilities

Final design of the SENTRY/ATLAS launch complex at Vandenberg Air Force Base is progressing. A slight delay in completion of the design will result from changes in facility design criteria. Design completion is now scheduled for 15 November instead of 1 November.

2. Assembly Building

An in-progress review of final construction plans for the guided missile assembly building was held early in September. Submittal of completed plans and specifications incorporating all review changes is scheduled for 7 November.

3. Tracking, Control Telemetry and Data Acquisition Facilities

a. Interim tracking and telemetry facilities at Vandenberg Air Force Base were beneficially occupied. Completion of design of the permanent test tracking facility was delayed owing to a change of criteria affecting the data acquisition and processing building. It is planned to contract for the entire station, less the data acquisition and processing building, and to contract separately for that structure.

b. Interim tracking and telemetry facilities were beneficially occupied at the Naval Air Missile Test Center, Point Mugu, California.

c. Interim tracking and telemetry facilities at Kaena Point, Oahu Island, Hawaii, were beneficially occupied and equipping was underway. The contract to complete the tracking station was awarded during September.

d. Design of the Northwest tracking and data acquisition station at Fort Stevens, Tongue Point, Oregon, progressed satisfactorily. Completion is scheduled for 20 October.

e. Tracking and telemetry facilities at Annette Island, Alaska, and at Cape Chiniak, Kodiak Island, Alaska, are beneficially occupied.

f. The New Boston Bombing Range, Grenier Air Force Base, New Hampshire, was approved as the Northeast tracking and data acquisition station. The architect-engineer for design of this station was selected in September. Design will be accomplished by site and climatic adaptation of the Northwest tracking and data acquisition station plan.

g. The former Naval Air Station at Ottumwa, Iowa, was approved as the site of the Central tracking and data acquisition station.

h. Because of recent changes in the weights of certain radars to be utilized at all tracking and data acquisition stations, redesign of their supporting structures will be necessary.

J. OPERATIONS AND PLANS

During September briefings outlining program objectives and funding requirements for the SENTRY program for fiscal years 1959 and 1960 were presented to representatives from the Strategic Air Command, the Air Research and Development Command, the USAF Ballistic Missiles Committee, and the Advanced Research Projects Agency.

Figure 1. SENTRY/THOR engine serial #1 undergoing one of the ten hot firing conducted with the engine during September at the Santa Cruz Test Base. Engines scheduled for the first two SENTRY/THOR flight test vehicles were subjected to similar static firings at Lockheed. All SENTRY/THOR XLR81-Be-3 engines have been acceptance tested and delivered to Lockheed Missile System Division.

(WDPC-58-30)

257

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Upgraded to Secret per Auth Ltr, WDPC 15 Oct 58 subject: "WS117L Program Status Report 10-16-58

Figure 2. First SENTRY flight test satellite is shown here on a transporter-erector. Final design of the first two THOR-boosted SENTRY flight vehicles has been completed, and equipment installation is now underway on the remaining SENTRY/THOR vehicles.

(WDPC-58-30)

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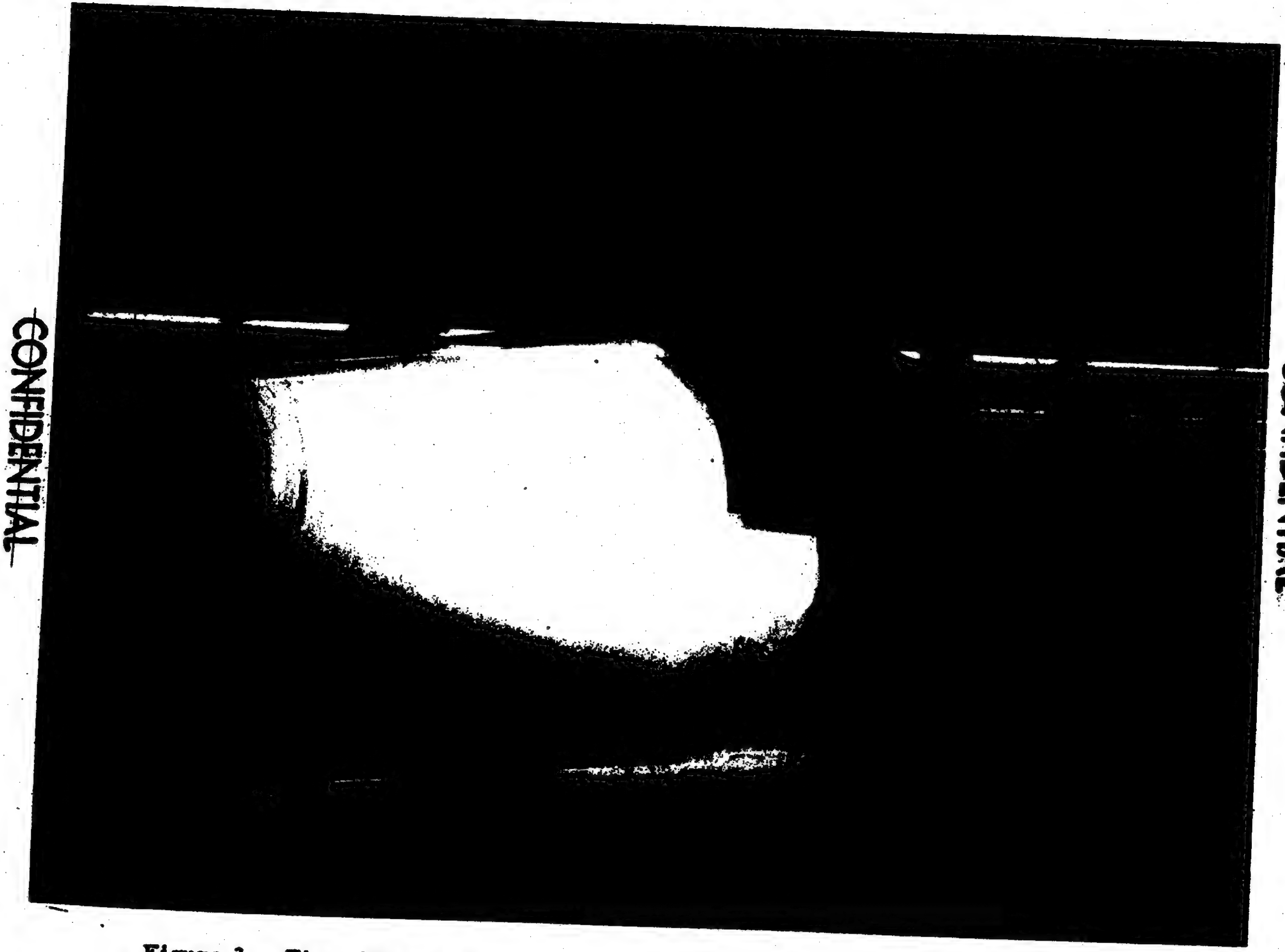

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Figure 3. First SENTRY flight test satellite ready for shipment to the Santa Cruz Test Base.
(WDPC-58-30)

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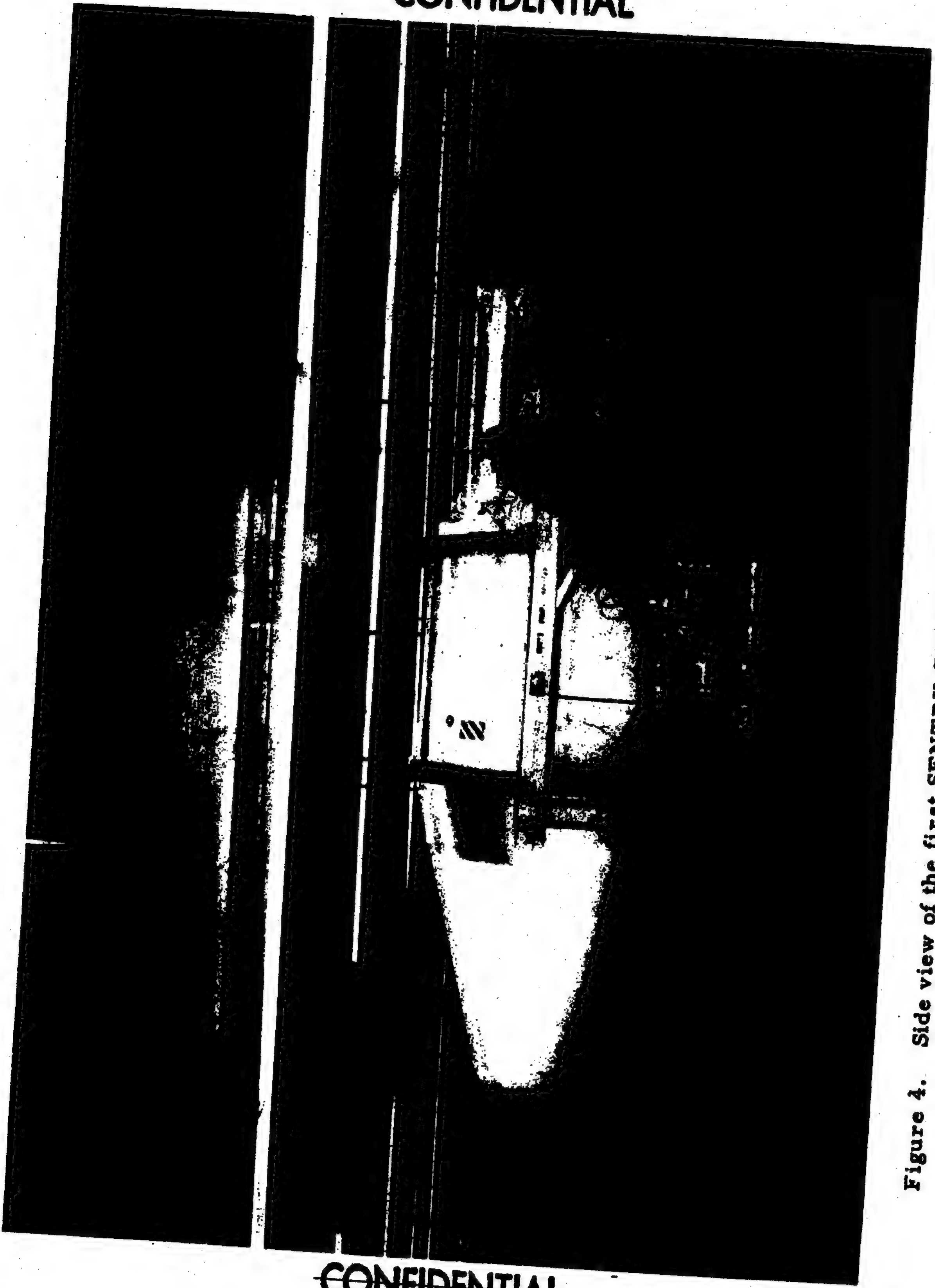

Figure 4. Side view of the first SENTRY flight test satellite on its transporter-erector. (WDPC-58-30)

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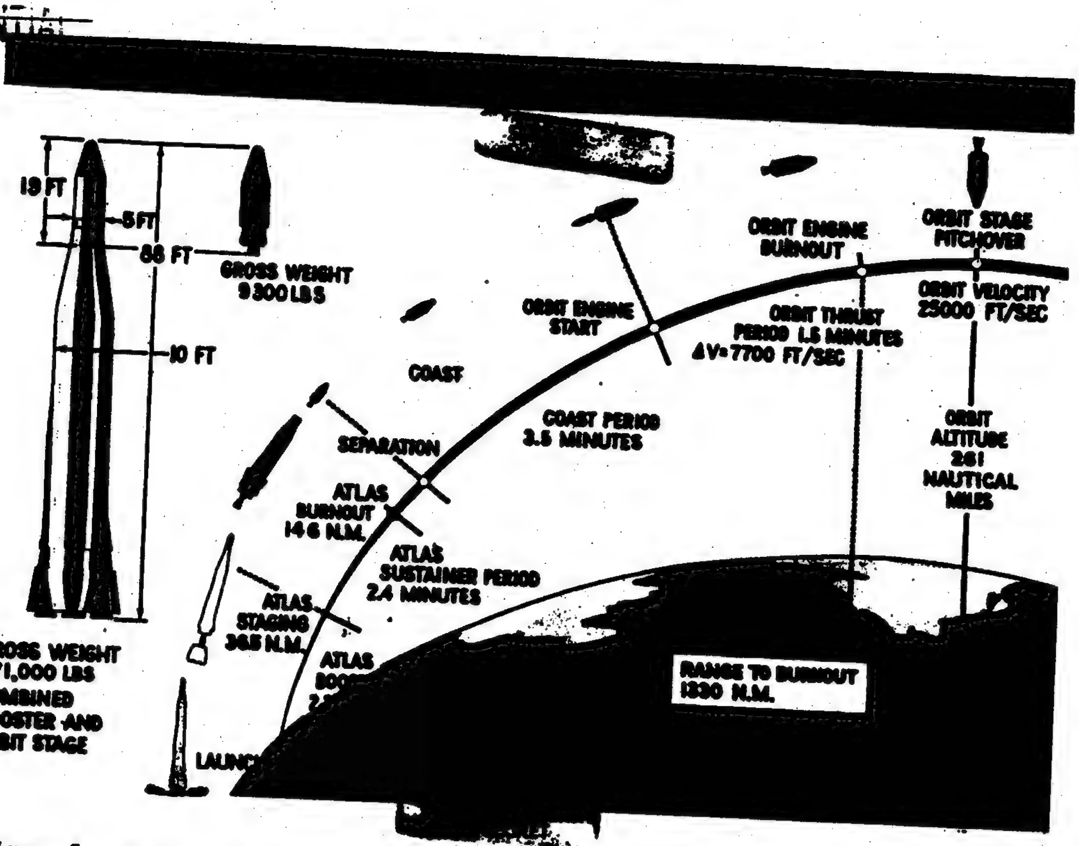
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5 FT
88 FT
10 FT
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GROSS WEIGHT 271,000 LBS COMBINED BOOSTER AND ORBIT STAGE
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ATLAS BOOS 2.
ATLAS STAGING 36.5 N.M.
ATLAS SUSTAINER PERIOD 2.4 MINUTES
ATLAS BURNOUT 146 N.M.
SEPARATION
COAST
COAST PERIOD 3.5 MINUTES
ORBIT ENGINE START
ORBIT THRUST PERIOD 1.5 MINUTES ΔV=7700 FT/SEC
ORBIT ENGINE BURNOUT
ORBIT STAGE PITCHOVER
ORBIT VELOCITY 25000 FT/SEC
ORBIT ALTITUDE 261 NAUTICAL MILES
RANGE TO BURNOUT 1330 N.M.

Figure 5. This chart depicts a typical launch-to-orbit trajectory of the SENTRY vehicle. (WDPC-58-30)

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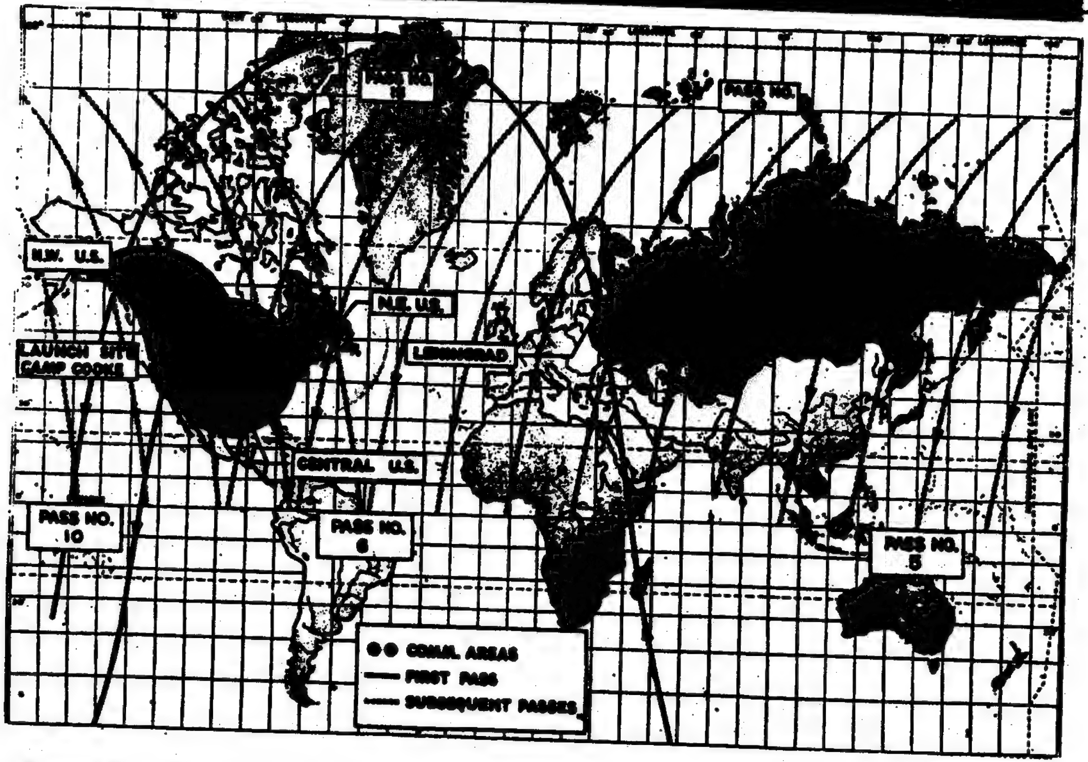

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Figure 6. All aspects of the guidance and control subsystem for the THOR-boosted SENTRY program are on schedule. This chart outlines the typical ground trace of the SENTRY satellite when launched on an 183 degree orbit. (WDPC-58-30)

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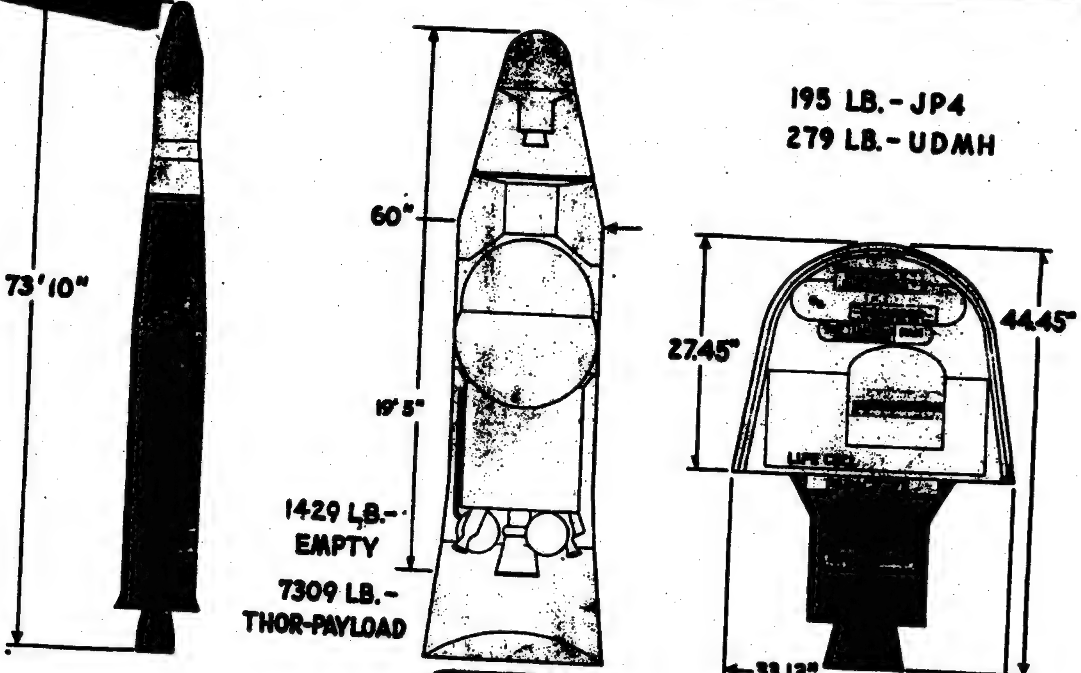

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Figure 7. All SENTRY biomedical equipment development is on schedule. A mock-up of the biomedical recovery capsule, as depicted here, has been completed; the first capsule is scheduled for delivery by General Electric in October. (WDPC-58-30)

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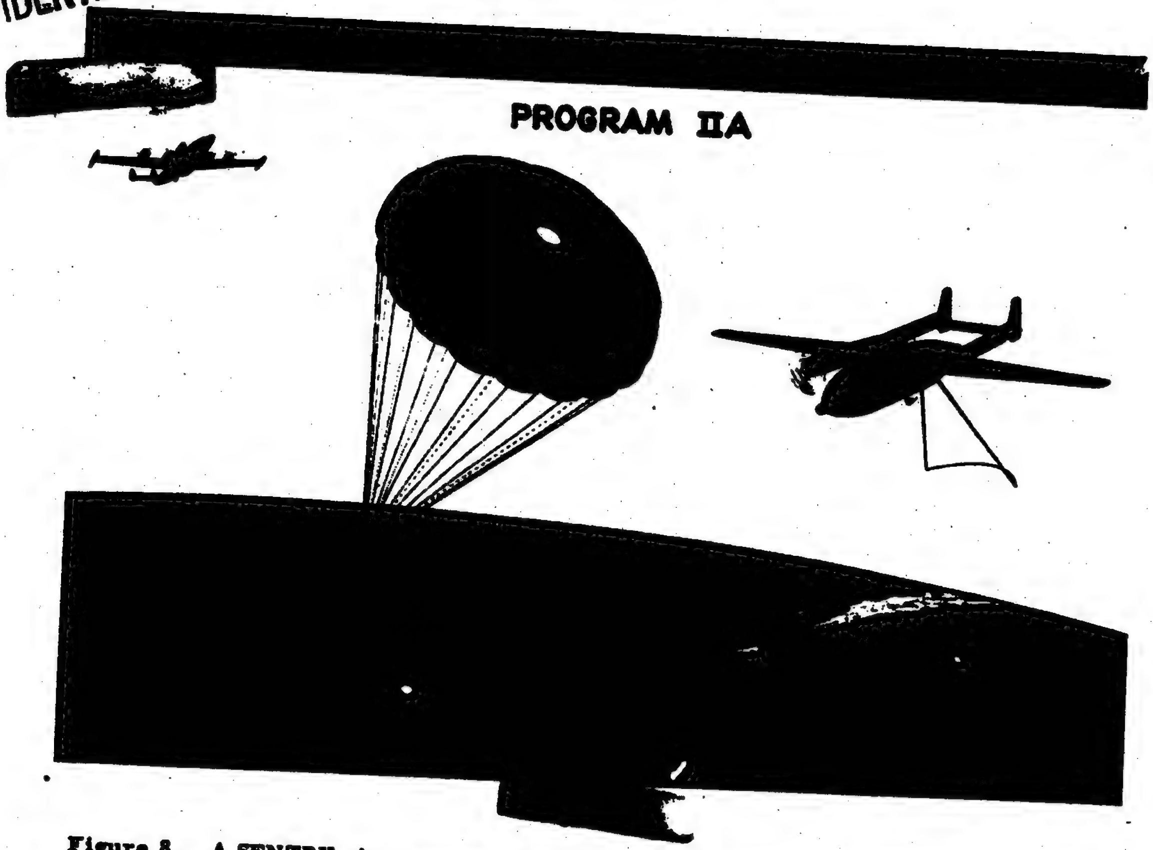

Figure 8. A SENTRY air recovery test program is underway, and detailed plans have been established for the recovery of the biomedical package. Shown here is an artists conception of the biomedical recovery system utilizing a C-119 aircraft.
(WDPC-58-30)

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THE POSSIBILITY OF A REVISED PROGRAM WILL BE DISCUSSED FURTHER BY REPRESENTATIVES OF MY OFFICE WITH BMD PEOPLE
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JOINT MESSAGEFORM CONFIDENTIAL SECURITY CLASSIFICATION [redacted]

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FROM:

COMMANDER AIR FORCE BALLISTIC MISSILE DIVISION
INGLEWOOD CALIFORNIA

SPECIAL INSTRUCTIONS

TO:

COMMANDER ARDC
ANDREWS AFB MD

INFO: COFS HQ USAF
WASHINGTON DC

~~SECRET~~ FROM WDG-11-8-E

INFO TO AFCGM, HQ USAF. QUOTED FOR YOUR INFORMATION AND ACTION IS A RECENT TWX RECEIVED FROM OSD: "SECRET DEF 949420 FOR COMMANDING GENERAL FROM ARPA SIGNED JOHNSON. PLEASE TAKE ACTION IMMEDIATELY TO CANCEL ALL ELEMENTS OF THE 117L SENTRY PROGRAM DIRECTED TOWARD PROVIDING AN ATLAS LAUNCH CAPABILITY AT PATRICK AFB. DEFER ACTION ON THE BOOSTERS THEMSELVES UNTIL FURTHER NOTICE. THESE BOOSTERS ARE NOT TO BE CANCELLED SINCE THEY MAY BE USED IN A REVISED SENTRY FIRING SCHEDULE OUT OF COOKE. THE POSSIBILITY OF A REVISED PROGRAM WILL BE DISCUSSED FURTHER BY REPRESENTATIVES OF MY

DATE 11	TIME
MONTH OCT	YEAR 58

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ACTION	PRIORITY	BOOK	MULTI	SINGLE			
INFO							

FROM: COMMANDER AIR FORCE BALLISTIC MISSILE DIVISION INGLEWOOD CALIFORNIA

TO:

SPECIAL INSTRUCTIONS

SECRET WDG-11-8-E CONTD

OFFICE WITH BMD PEOPLE." THIS INSTRUCTION FROM OSD IS CONSIDERED CONTRARY TO USAF INTERESTS. AFBMD MESSAGES WDZW-10-5-E AND WDZW-10-9-E CONTAIN ADDITIONAL INFORMATION ON THIS SUBJECT. EARLY ACTION ON OUR RECOMMENDATIONS CONTAINED THEREIN IS ESSENTIAL.

DATE	TIME
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HARRY L. EVANS
COLONEL, USAF
DIRECTOR OF 117L

DD FORM 1 MAY 55 173 REPLACES DD FORM 173, WHICH WILL BE USED UNTIL EXHAUSTED

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PRIORITY
ROUTINE X AF DEF 949420 ~~SECRET~~
COMDR AFBMD (ARDC) INGLEWOOD CALIF

OSD ARPA WASH DC

INFO: COFS USAF WASH DC

COMARDC ANDREWS AFB MD

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~~SECRET~~/FROM WDPP 10-1-E.

COFS FOR AFCGM. ARDC FOR RDZ. REFERENCE YOUR MESSAGE DEF 949420 DATED 11 OCT 58. 117L LAUNCHES PREVIOUSLY SCHEDULED FOR AFMTC ARE CANCELLED. HOWEVER, 5 ATLAS BOOSTERS ORIGINALLY ALLOCATED TO THESE LAUNCHES AT AFMTC REMAIN IN ATLAS PRODUCTION SCHEDULE WITH DELIVERY TO BEGIN DURING FIRST QUARTER 1959 IN THE MODIFIED 117L CONFIGURATION. FUNDING FOR THESE 5 BOOSTERS QUOTED AT 12 MILLION DOLLARS NOT INCLUDED IN ANY CURRENT AFBMD FUNDING PROGRAM. IN VIEW OF PRODUCTION AND DELIVERY CONSIDERATIONS, REQUEST CONFIRMATION OF THE FOREGOING DELIVERY SCHEDULE AND ISSUE OF OBLIGATION AUTHORITY FOR THESE BOOSTERS AT EARLIEST POSSIBLE DATE.

20 22
OCT 58

WDPP

WALTER SANDERS, MAJOR, USAF
2232 1 1

SIGNED

O. J. RITLAND
Brig. Gen., USAF
Vice Commander

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24 OCT 1958 [illegible] 33

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INFO WDGEV
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WDEV

Date: 23 Oct 58

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FM COMARDC ANDREWS AFB MD
TO COMAFBMD /ARDC/ INGLEWOOD CALIF
BT
/UNCLAS/FROM RDZGW-10-37-E. FOR WDGE, COL HAMILTON SMCLN WDG, COL CURTIN, AND WDZW, COL EVANS. THE FOLLOWING TWX MESSAGE FROM THE DIRECTOR OF BUDGET, HQ USAF, IS QUOTED FOR YOUR INFORMATION CLN QUOTE CLN UNCLAS FROM AFABF 46472. REFERENCE YOUR WDZW 10-14-E, THIS HQ AGREES WITH YOUR ACTIONS IN NOT REPEAT NOT REDUCING THE PROGRAM EFFORT FOR WS-117L AT THIS TIME. IT IS FURTHER AGREED THAT ARPAS LETTER OF 25 SEPTEMBER 1958 NEED NOT BE COMPLIED WITH BY YOUR DIVISION. 19, 22 OCTOBER 1958 THIS HQ IS MEETING WITH ARPA OFFICIALS TO DISCUSS THE 117L PROGRAM AND WILL PROVIDE FURTHER GUIDANCE AS A RESULT OF THIS MEETING. UNQUOTE.
BT
23/2135Z OCT RJEZFF

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DO U HAVE MORE IN OUT OF PAIR
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HOLD HIM THEN PLS

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43

SENTRY PROGRAM STATUS REPORT

Month Ending 31 October 1958

RCS DD-SD(M) 242

870

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AIR FORCE BALLISTIC MISSILE DIVISION
HEADQUARTERS
AIR RESEARCH AND DEVELOPMENT COMMAND
United States Air Force
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10 November 58

SENTRY PROGRAM STATUS REPORT
Month Ending 31 October 1958
RGS DD-SD(M) 242

271

FOREWORD

This report summarizes the progress made in the SENTRY Program during the month of October 1958.

~~R. Curtin~~ for

B. A. SCHRIEVER
Major General, USAF
Commander

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SENTRY PROGRAM STATUS REPORT

GLOSSARY

272

PROGRAMS

Program I	ATLAS-boosted Engineering Prototype Test
Program IIA	Engineering Test and Biomedical Program
Program II	Pioneer Visual Reconnaissance Program
Program III	Pioneer Electronic Reconnaissance Program
Program IV	Advanced Visual Reconnaissance Program
Program V	Advanced Electronic Reconnaissance Program
Program VI	Visual Surveillance Program
Program VII	Infrared Surveillance Program
Program VII	Electronic Surveillance Program

PROPULSION

Booster	ATLAS and THOR Missiles	
ARS	XLR81-Be-3	15,150-lb thrust engine; pump-fed; 263 lb sec/lb vacuum specific impulse; JP-4/IRFNA
	XLR81-Be-5	15,150-lb thrust engine; pump-fed; 277 lb sec/lb vacuum specific impulse; unsymmetrical di-methyl hydrazine (UDMH); inhibited red fuming nitric acid (IRFNA)

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SENTRY PROGRAM STATUS REPORT
Month Ending 31 October 1958
RCS DD-SD(M) 242

I. BRIEF OF PROGRESS

The first flight test vehicle has successfully completed flight readiness testing at the Santa Cruz Test Base. The successful 20 second hot firing test took place on 28 October, with all vehicle components including satellite telemetry in operation. After completion of the testing the vehicle was shipped to the Vandenberg Air Force Base launch site on 31 October.

The THOR booster for the first sentry flight has been completely modified and checked out. It is in the missile assembly building at Vandenberg Air Force Base, ready for mating with the flight test vehicle. The THOR/SENTRY mating will take place in early November and the mated vehicle will be erected for launch stand checkout on 10 November. Launch is scheduled for 6 December.

Checkout and acceptance of ground support equipment is proceeding on schedule at Vandenberg Air Force Base. A facilities checkout vehicle was utilized for checkout of ground support equipment prior to arrival of the first flight article.

Flight test vehicles #3 and #4 are being modified in design as a result of experience gained during systems checkout of flight test vehicles #1 and #2.

The program for development of titanium pressurization spheres for the SENTRY propellant pressurization system has been accelerated because of failures which have occurred in the present fiber glass spheres. Due to lack of experience with titanium, another program will provide for the availability of backup steel spheres if needed.

Radar complexes in unfriendly areas of the world are being plotted for use with the Ferret Subsystem.

The development model of the Visual Reconnaissance Subsystem is scheduled for delivery in November.

Installation and checkout of equipment at the Annette Island and Chiniak, Alaska, satellite tracking and data link stations is slightly behind schedule. However, the stations are expected to be ready for the first SENTRY launch.

The Biomedical Recovery Program components and techniques are being subjected to studies and tests to provide maximum probability of capsule recovery.

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II. TOPICAL SUMMARY

A. FLIGHT TEST PROGRAM

1. The first flight test vehicle successfully completed flight readiness testing at Santa Cruz Test Base during September. The vehicle was erected on test stand #1 and subjected to five complete countdown cycles in preparation for the hot firing (Figures 1 & 2). After completion of the five hour countdown the 20 second hot firing was performed without incident on 28 October. A number of minor difficulties in the test instrumentation as well, as a faulty valve in the fuel flow system, were discovered during the countdown.

2. All vehicle components were in operation, including the satellite telemetry equipment. Test stand instrumentation data and vehicle telemetry data are being evaluated.

274

3. The vehicle was removed from the test stand and shipped to the launch site at Vandenberg Air Force Base on 31 October.

4. The facilities checkout vehicle, which was shipped to the Vandenberg launch site in August, was used for the October checkout and acceptance of launch equipment prior to the arrival of the first flight article. Acceptance of systems checkout equipment, ground support equipment, pad launch equipment, and blockhouse equipment is proceeding on schedule.

5. Types of ground support equipment being delivered and accepted at the launch site are shown in Figure 3.

6. Major efforts were directed toward insuring the delivery of systems checkout equipment for the airframe, propulsion and auxiliary power subsystem to Vandenberg. The principal items of equipment in this category, which were completed and delivered, included pressurization and tankage checkout console; propulsion system checkout console; the auxiliary power checkout unit; and the guidance and control checkout console (figures 3 & 4).

B. SATELLITE AIRFRAME SUBSYSTEM

1. THOR 160, the booster for the first SENTRY launch, was shipped to the Vandenberg launch site on 10 October where it was completely checked out, modified and readied for mating with the SENTRY satellite. The missile is presently in the missile assembly building at Vandenberg undergoing premate checks. The first THOR/SENTRY satellite will be mated in early November. The THOR/SENTRY is scheduled to be erected, and launch stand checkout initiated, on 10 November.

2. Propulsion test vehicle assembly #4 has been added to the program to replace propulsion test vehicle assembly #2 (PTVA-2), which was irreparably damaged during a hot firing. This new vehicle will be built to the SENTRY/THOR UDMH configuration. Structural drawings for PTVA-4 have been completed and fabrication is underway.

3. The design of flight test vehicles #3 and #4 is being modified as necessary, based on information received from the systems checkouts of flight test vehicles #1 and #2.

4. The program for development of titanium pressurization spheres for the SENTRY propellant pressurization system has been accelerated due to failures under pressurization of the present fiber glass spheres. Since experience in the use of titanium for pressure spheres is limited, a backup program will provide steel pressure spheres for use on early SENTRY flights if necessary.

C. SATELLITE PROPULSION SYSTEM

1. A detailed analysis of recorded test data and an examination of motion pictures has confirmed the cause of the explosion that destroyed the propulsion test vehicle assembly #2 (PTVA-2) originally reported in September. Detonation was caused by JP4 fuel, trapped in a fuel valve from a previous JP4 firing, entering the combustion chamber ahead of the UDMH starting slug. An explosive mixture was formed with the JP4 and the inhibited red fuming nitric acid oxidizer, which detonated when the UDMH was injected. Review of the pre-run preparation procedures established the cause as failure to purge the fuel valve prior to attempting a start.

2. Preparation of PTVA-1 was accelerated to permit continuation of the testing program with minimum loss of time. This vehicle, damaged from failure of the fiber glass pressurization sphere (reported in September), was repaired to JP4 configuration and returned to the Santa Cruz Test Base. One additional PTVA is being constructed to UDMH configuration.

D. FERRET RECONNAISSANCE SUBSYSTEM

1. Plots of anticipated radar complexes in the Soviet bloc are being prepared by Haller, Raymond and Brown, Inc., subcontractor to Lockheed Aircraft for the Ferret subsystem. The plots will be used for comparison of the ferret data with known data. The total number of radars in a complex and the function and type of individual radars anticipated are being plotted. The frequency and pulse width of each radar is estimated using this information and the catalogs of known Russian emitters.

2. Equipment for the initial ferret subsystem flight is in the pre-production design stage. Environmental testing of the initial structure and electronic components is proceeding satisfactorily. The concept of operation of the Ferret and Visual subsystems is shown in Figure 5.

E. VISUAL RECONNAISSANCE SUBSYSTEM

1. The developmental model of the airborne portion of the Visual Reconnaissance subsystem is nearing completion and delivery is expected in November. The electronic readout portion of this equipment will be breadboard equipment as the developmental model has not yet satisfied design requirements.

F. COMMUNICATION SUBSYSTEM

1. Communication subsystem activities were mostly concerned with installation and checkout of the command and data link equipment at the satellite tracking and data acquisition stations (Figure 6). A complete inspection of the Annette Island and Chiniak Station at Kodiak Island, Alaska, was made in October. Installation and checkout of the stations are behind schedule. However, progress made, and the high morale of the crew indicates the stations may be ready for the 6 December launch. While the inspection party was at Annette Island, crews continued installation of outside equipment over a twenty-four hour period during which eight inches of rain fell.

G. BIOMEDICAL RECOVERY PROGRAM

1. Antenna and receiver equipment installation in the C-119 capsule recovery aircraft has been delayed due to receiver shortages. This equipment is designed for homing on the VHF beacon installed in the Biomedical Capsule. Present planning calls for completion of all receiver installations by 8 December. All C-119 capsule recovery aircraft will have receivers installed prior to overseas departure.

2. The high G forces resulting from aerial intercept and pickup of the parachute borne biomedical capsule by the C-119 recovery aircraft are being minimized. Mutual adjustment of aircraft speed, the mass of the winch that snags the capsule, and capsule acceleration resulting from aircraft lock-on are being studied to reduce the forces exerted by the recovery operation.

3. A study is underway to evaluate the radar target characteristics of one pound of chaff, ejected from the capsule at 50,000 feet. The purpose of the study is to increase the radar reflectance of the capsule and assist in capsule detection by the RC-121 radar tracking aircraft.

4. Two parachutes have been designed for slowing the descent of the biomedical capsules to allow time for radar detection, tracking, and aerial recovery of the capsules. The Mark I parachute is 14.4 feet in diameter and will carry a 60 pound payload. It will be used in the THOR boosted SENTRY biomedical capsule recovery program. The Mark II parachute is 20 feet in diameter, will carry a 120 pound payload, and is designed for use in the ATLAS boosted SENTRY biomedical recovery program. Both parachutes are silvered for better radar reflectance. Tests of radar detection of the silvered parachutes are now in progress.

5. Water detection tests have been completed to assist in recovery of the biomedical capsule in event aerial recovery is not successful. A VHF homing beacon and flashing light planned for installation on the capsule were detected at a range sufficient to meet test objectives.

277

H. FACILITIES AND SITES

1. Launch Facilities

Final design of the ATLAS-boosted SENTRY launch complex at Vandenberg Air Force Base will be delayed because of changes in facility design criteria. Design completion has been rescheduled from 1 November to 15 November. No program delay will result.

2. Assembly Building

Final plans for the guided missile assembly building at Vandenberg are complete. The project will be advertised for construction bids after review and approval of plans. Advertising is scheduled to begin on 7 November. Estimated completion date is 10 October 1959.

3. Tracking, Control Telemetry, and Data Acquisition Facilities

a. Plans for the permanent station at Vandenberg are complete and will be released to the construction agency on 1 November. Completion of construction is estimated for July 1959.

b. Additional construction required to complete interim tracking and telemetry facilities at Kaena Point, Oahu Island, Hawaii, was started during September and is progressing on schedule. Construction will be completed in June 1959.

[redacted] CONFIDENTIAL

Figure 1. Photo Confidential Caption Secret

The first 117L flight test vehicle, shown being erected in Test Stand #1 at Santa Cruz Test Base, completed a successful flight readiness firing 28 October. All vehicle components including satellite telemetry equipment were in operation during the 20 second hot firing.

CONFIDENTIAL SECRET

(WDPCR-58-3)

[redacted] ~~CONFIDENTIAL~~

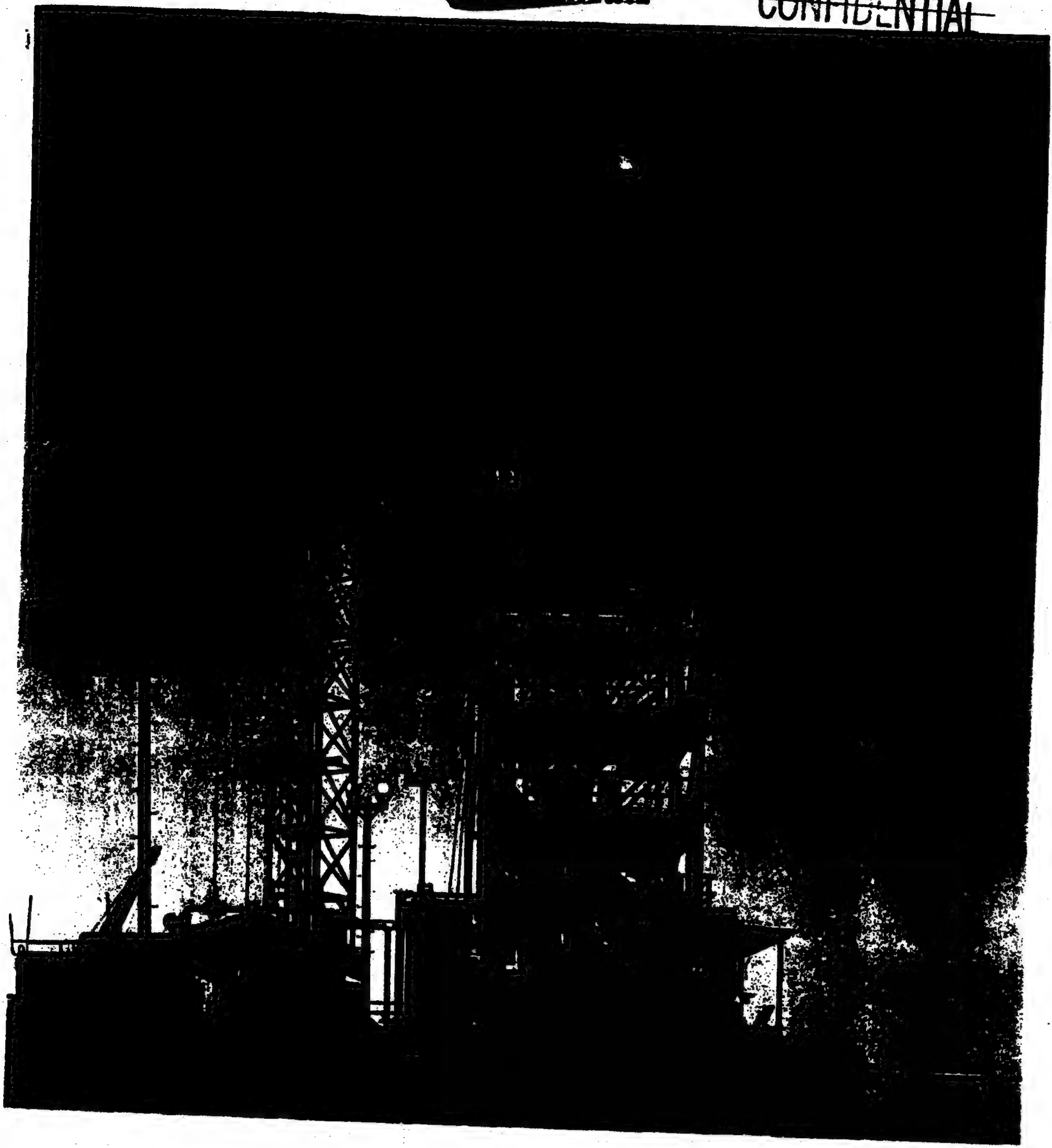

Figure 2. Photo Unclassified Caption ~~Confidential~~

Overall view of 117L Test Stand #1, Santa Cruz Test Base. Following a successful flight readiness firing of the initial 117L flight test vehicle, 28 October, the vehicle was removed from the stand and transported to the Vandenberg Air Force Base launch site, 31 October.

(WDPCR-58-3)

~~CONFIDENTIAL~~ [redacted]

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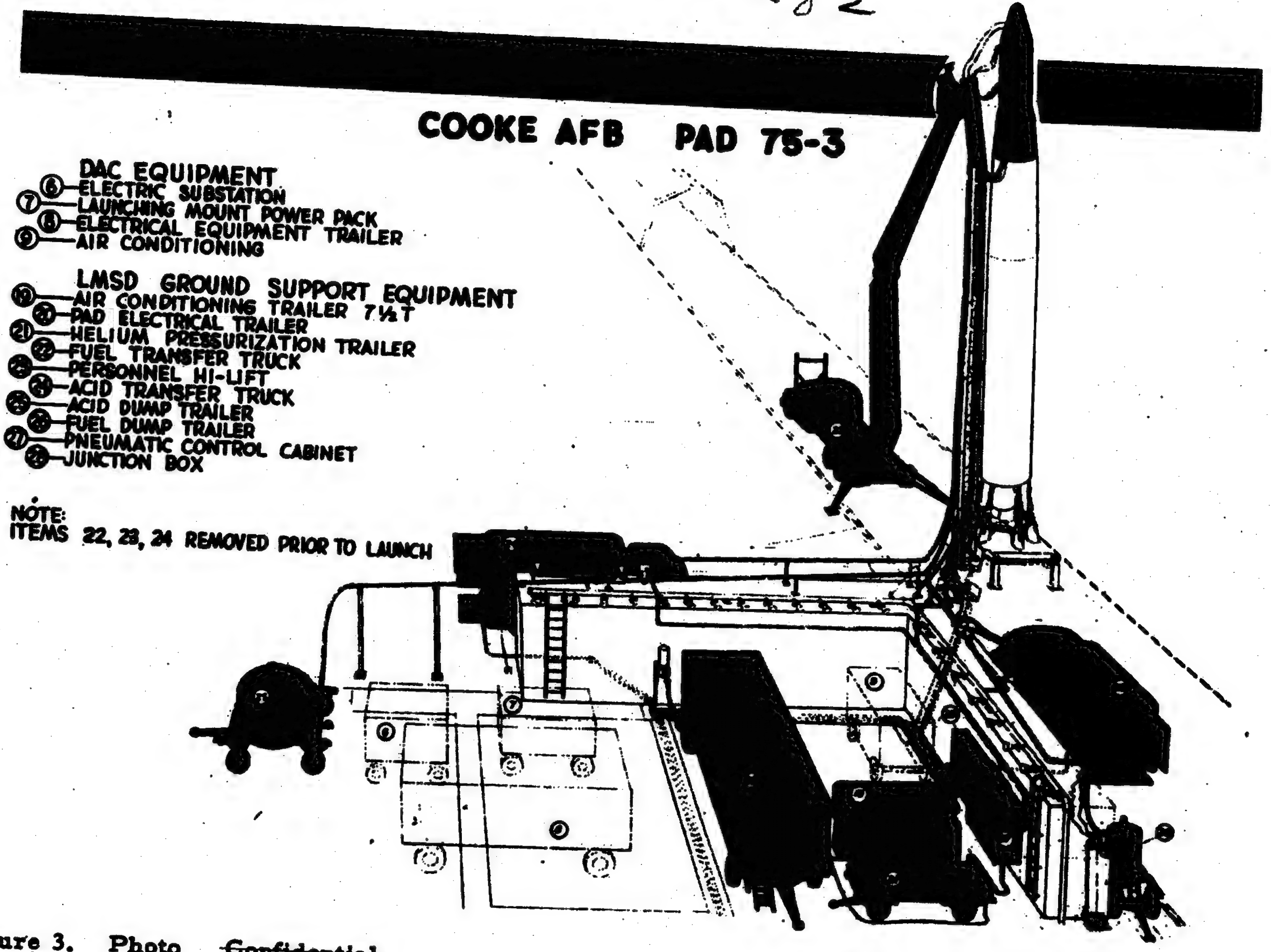
COOKE AFB PAD 75-3
DAC EQUIPMENT
⑥—ELECTRIC SUBSTATION
⑦—LAUNCHING MOUNT POWER PACK
⑧—ELECTRICAL EQUIPMENT TRAILER
⑨—AIR CONDITIONING
LMSD GROUND SUPPORT EQUIPMENT
⑲—AIR CONDITIONING TRAILER 7½T
⑳—PAD ELECTRICAL TRAILER
㉑—HELIUM PRESSURIZATION TRAILER
㉒—FUEL TRANSFER TRUCK
㉓—PERSONNEL HI-LIFT
㉔—ACID TRANSFER TRUCK
㉕—ACID DUMP TRAILER
㉖—FUEL DUMP TRAILER
㉗—PNEUMATIC CONTROL CABINET
㉘—JUNCTION BOX
NOTE:
ITEMS 22, 23, 24 REMOVED PRIOR TO LAUNCH

Figure 3. Photo ~~Confidential~~ Caption Official Use Only

Weapon System 117L launch facility, Pad 75-3, Vandenberg Air Force Base. Typical items of ground support equipment, now being delivered and accepted at the launch site, are identified.

(WDPCR-58-3)

[redacted]

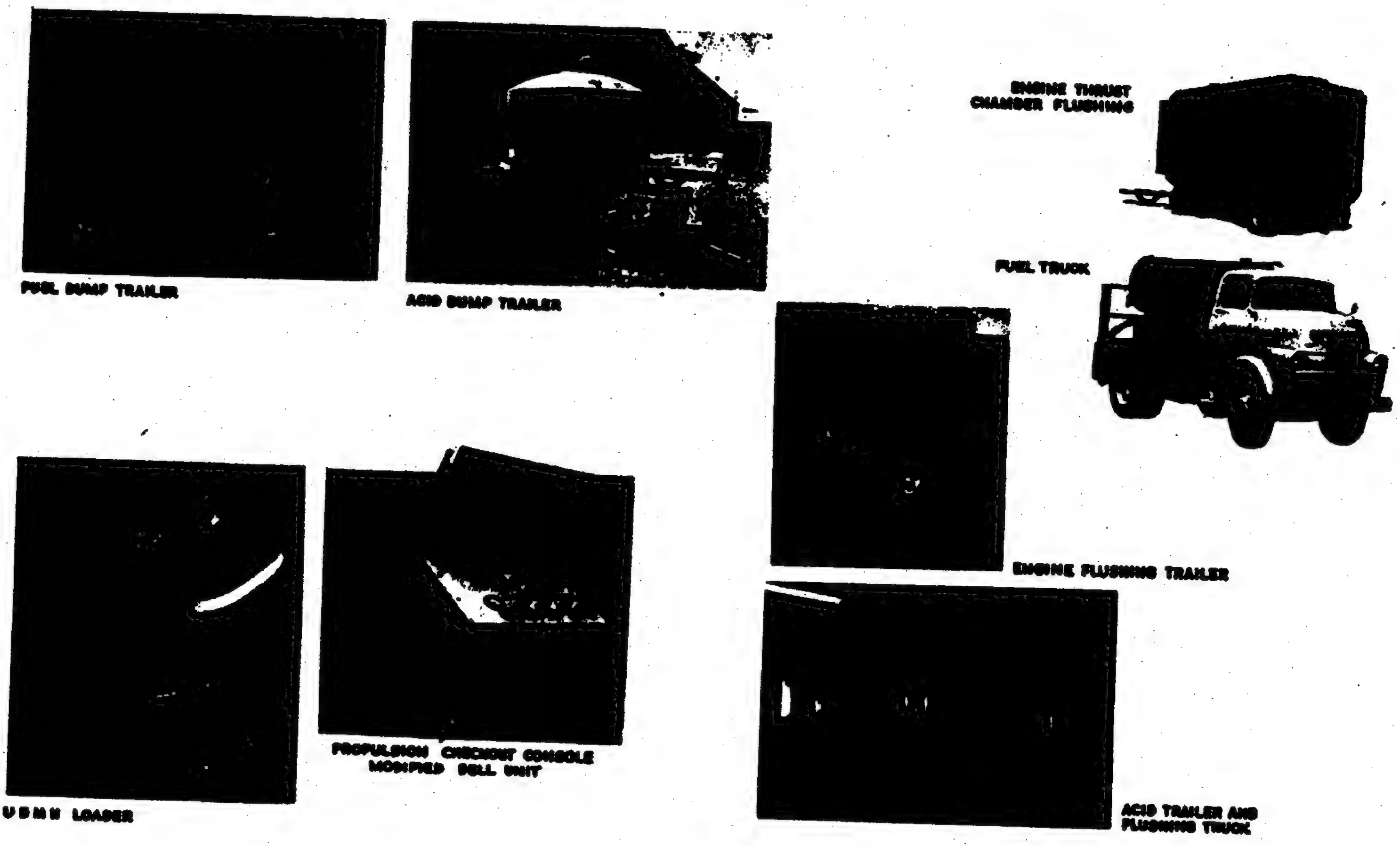
FUEL DUMP TRAILER
ACID DUMP TRAILER
ENGINE THRUST CHAMBER FLUSHING
FUEL TRUCK
ENGINE FLUSHING TRAILER
UDMH LOADER
PROPULSION CHECKOUT CONSOLE MODIFIED BELL UNIT
ACID TRAILER AND FLUSHING TRUCK

Figure 4. Photo ~~Confidential~~ Caption Official Use Only

117L Weapon System ground support equipment. Major efforts are being made toward delivery of systems checkout equipment to Vandenberg Air Force Base.

(WDPCR-58-3)

[redacted]

117L

~~CONFIDENTIAL~~ 274

3 DEC 1958

WDZW

(See reverse side for name & address of others this letter was sent)

Mr. Amron H. Katz
The RAND Corporation
1700 Main Street
Santa Monica, California

DOWNGRADED AT 12 YEAR INTERVALS; NOT AUTOMATICALLY DECLASSIFIED. DOD DIR 5200.10

Dear Mr. Katz:

I have asked General Graul and his staff at Rome Air Development Center to have the Special Studies Committee report to me for a temporary period of time in view of nationally important events that concern the WS 117L program. It is requested that the scope of your deliberations be expanded to include recommendations on:

a. The qualitative aspects of improved sensors.

b. The utility of presently programmed and possible improved sensors and associated methodology to meet stated intelligence needs for the system to rapidly report useful data from a changing and widely dispersed group of priority locations.

c. The integration of these sensors with data-handling requirements.

Major H. F. Wienberg is presently making arrangements to have all necessary information presented to the committee at your next meeting scheduled for 15 - 16 December at Rome Air Development Center. I indeed hope the committee will be prepared to submit to me shortly thereafter, the first report covering program progress and recommendations considered necessary to achieve a reliable and timely capability.

Sincerely yours,

ORIGINAL SIGNED:
B. A. SCHRIEVER

B. A. SCHRIEVER
Major General, USAF
Commander

This document contains information affecting the National Defense of the United States within the meaning of the Espionage Law, Title 18, U. S. C., Section 793 and 794. Its transmission or the revelation of its contents in any manner to an unauthorized person is prohibited by law.

WDZWB dh(25 Nov 58) [redacted]
Maj Wienberg/ 27

WDZW 58-646
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3 DEC 1958

WDZW

Brig General Donald P. Graul
Commander
Rome Air Development Center
Griffiss Air Force Base, New York

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Dear General Graul:

I have recently had the opportunity to be briefed on the status and progress of the WS 117L Subsystem I effort for which your Intelligence Laboratory is responsible. I want you to know that I am very pleased with the excellence of the results, the development approach and manner in which the project is being pursued. It was indeed unfortunate that the briefing data conflicted with your scheduled meeting with General Anderson and prevented your attendance.

I am particularly interested in the advisory committee which your people had the foresight to establish. Certain nationally important events concerning the program make it necessary to muster this type of support in back of the over-all WS 117L program, from the point of mission usefulness and the special reconnaissance and data processing elements which make it possible to exploit this usefulness.

In view of the urgency of this need, I have requested that Professor Harry Goode have his committee report to me directly for a limited period of time and that the scope of their deliberations include improved sensor systems and utility as well as their integration with the data processing requirements.

Members of my staff have already contacted Mr. Richard Libby, Chief of the Intelligence Laboratory, and he has enthusiastically offered to have the committee and his staff respond in every way that will best serve the over-all interests of the Air Force.

Kindest personal regards,

ORIGINAL SIGNED:
B. A. SCHRIEVER

B. A. SCHRIEVER
Major General, USAF
Commander

Copies furnished:
Mr. R. Libby, RADC
Maj H. F. Wienberg, WDZWS

WDZW 58-641
Cy 3 of 9

WDZWS
Maj Wienberg

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AIR FORCE BALLISTIC MISSILE DIVISION
HEADQUARTERS
AIR RESEARCH AND DEVELOPMENT COMMAND
UNITED STATES AIR FORCE
Post Office Box 262
Inglewood, California

WDPCR

10 December 1958

SUBJECT: SENTRY Program Progress Report
for November 1958

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INTERVALS; NOT AUTOMATICALLY
DECLASSIFIED. DOD DIR 5200.10

TO: Director
Advanced Research Projects Agency
Washington 25, D.C.

287

1. This report covers progress in the SENTRY program during the month of November 1958. Special emphasis has been placed on progress of the first SENTRY flight, which is scheduled for December.

2. **STATUS OF FIRST SENTRY FLIGHT**

a. **LAUNCH DATE**

The planned launch date for the first SENTRY flight has been rescheduled from 6 December to 20 December. The additional time interval will be utilized for more extensive testing of the mated SENTRY/THOR. This additional testing will improve the probability of achieving a completely successful first flight.

b. **BOOSTER**

THOR 160, the booster for the first flight, was mated with the facility checkout vehicle on 25 November for compatibility tests. The facility checkout vehicle is a SENTRY flight vehicle configuration containing all components except guidance. The tests will include fueling system, umbilical connections, equipment countdown, and crew training tests. A decision was made to use the facility checkout vehicle instead of the flight test vehicle as reported last month, to spare the flight test vehicle from the wear encountered in the tests. After completion of these tests, in eight to thirteen days, the flight test vehicle will be mated to the booster.

c. **FLIGHT TEST VEHICLE**

The first flight test vehicle has been inspected and checked out. After a successful systems test on 23 November, the vehicle was declared ready for flight.

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76

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JUN 11 1959

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d. GROUND SUPPORT EQUIPMENT

All ground support equipment required for the first flight is in place at Vandenberg Air Force Base. Vehicle and launch pad equipment has been inspected, tested, and is ready for launch. Installation and test of blockhouse launch control and monitoring equipment is virtually completed and will be ready for the first launch.

e. TRACKING AND DATA ACQUISITION FACILITIES (SENTRY/THOR)

Final installation and testing of equipment at the Point Mugu and Vandenberg Air Force Base tracking stations is nearly complete. Tracking tests are underway utilizing aircraft equipped with a SENTRY radio beacon. The Alaskan and Hawaiian stations will have facilities necessary for the first flight available by the launch date. The ground communications link between all tracking stations and the control center at Palo Alto is complete and undergoing checkout tests.

f. OBJECTIVES OF FIRST FLIGHT

The primary objective of the first flight is to demonstrate the orbital capability of the SENTRY/THOR configuration. Included are tests of the SENTRY vehicle, the THOR booster, the Ground support equipment, and the ground environment. For this reason the payload aboard the first flight will consist of telementry equipment to provide data concerning vehicle booster performance and environmental conditions within the vehicle, rather than a sensory equipment. Primary test objectives are operational proof of the booster, the ground support equipment, the SENTRY airframe and adapter, the SENTRY propulsion system, the SENTRY auxiliary power unit, SENTRY guidance and control systems, and SENTRY telemetry, tracking and command equipment. Secondary test objectives are to obtain SENTRY internal thermal environment data, to prove guidance stabilization of the vehicle on orbit, tests of the interstation communications network, and determination of the attitude and aerodynamic integrity of the SENTRY/THOR within the limits of optical tracking capability. Tertiary objectives are tests of crew proficiency and ground equipment design from the human engineering point of view. The flight will also exercise recovery operations facilities through use of simulated data handling.

3. GENERAL STATUS OF SENTRY PROGRAMS

a. SUBSYSTEM B PROPULSION

(1) SENTRY flight vehicle #2, scheduled for flight in January, successfully completed a 23 second static firing at Santa Cruz Test Base on 20 November (Figures 1, 2, and 3). This vehicle was accepted by the Air Force and shipped to the launch site on 26 November.

(2) It has been decided to convert from the JP4 configuration engine to the Unsymetrical Dimethal Hydrazine (UDMH) configuration engine on the third SENTRY flight. The resulting increase in engine performance will provide greater program flexibility.

(3) The preliminary flight rating tests of the UDMH engine configuration were initiated on 15 November and will be completed by 15 January. Two engines are being used for the tests. Initial tests are being conducted at Bell Aircraft Rocket Division due to the heavy workload at Santa Cruz Test Base.

b. **SUBSYSTEM E - VISUAL RECONNAISSANCE**

A formal review of contractor progress in development of Subsystem E components was held on 13-14 November at Rochester, New York. It was concluded that development is proceeding at an acceptable rate. The Airborne components are now being converted from breadboard to airborne configuration. The satellite-borne photo reassembly processor is undergoing test. This component automatically develops the exposed film and prepares the image for transmission to the ground.

c. **SUBSYSTEM G - INFRARED RECONNAISSANCE PROGRAM**

Recent measurements utilizing high altitude balloons, indicate that a wider spectral band can be incorporated into the design of the infrared reconnaissance payload equipment. Widening the infrared band may permit greater detection range and accuracy in the final equipment.

d. **SUBSYSTEM L - BIOMEDICAL RECOVERY CAPSULE**

(1) Tests to refine and validate C-119 aircraft vectoring and aerial pickup techniques were completed during November.

(2) Radar detection tests of the biomedical recovery capsule parachute were successfully completed. The silvered parachute and associated package can be located by radar at approximately 98 miles range.

e. **FLIGHT VEHICLE STATUS**

STATUS	NO. OF VEHICLES
Launch Base	2
Santa Cruz Test Base	0
Modification & Checkout	3
Being Assembled	10

[redacted]

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f. **FACILITIES (SENTRY/ATLAS)**

(1) ARPA has authorized and made available 6.7 million dollars for design of construction of the Point Arguello launch complex. The contract is expected to be let on 19 December. Funds for the missile assembly building have not been released by ARPA pending review of siting at Washington level. Facility design plans were completed and turned over to the Corps of Engineers on 10 November. The tracking and data acquisition stations are in deferred status due to non-availability of funds.

(2) The contract for the permanent tracking and data acquisition station at Vandenberg Air Force Base is expected to be let in mid-December. The Hawaii facility is scheduled for completion in June 1959. The plans for the facility at Fort Stevens, Oregon, are complete; however, no contractual action can be taken due to lack of funds from ARPA. The operational phasing date is in jeopardy due to this delay.

(3) Design of the tracking and data acquisition station at New Boston, New Hampshire, is sufficiently advanced to permit site preparation. However, lack of funding has prevented site preparation prior to advent of severe winter weather. As a result, the operational phasing date is in serious doubt. The construction season in this area is too short to permit completion of a facility of this magnitude in one season. The architect-engineer for the tracking and data acquisition facility at Ottumwa, Iowa, was selected in November.

O J Ritland, Brig. Gen.
for
B. A. SCHRIEVER
Major General, USAF
Commander

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SECURITY CLASSIFICATION [redacted]

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77

PRECEDENCE	TYPE MSG (Check) BOOK	MULTI	SINGLE	ACCOUNTING SYMBOL	ORIG. OR REFERS TO	CLASSIFICATION OF REFERENCE
ACTION [illegible] INFO [illegible]		X		AF		

FROM: COMDR AFBMD, INGLEWOOD, CALIFORNIA

SPECIAL INSTRUCTION

TO: COFS, USAF, WASHINGTON, D. C.

INFO: COMARDC ANDREWS AFB MD
[illegible] AFB, [illegible]
CINCSAC OFFUTT AFB NEB

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SECRET FROM WDZW 12-25-E. FOR AFCIN. REFERENCE AFCIN MESSAGE [illegible]. IT IS BELIEVED THAT RECENT CONFERENCES INVOLVING GENERAL SCHRIEVER, GENERAL WALSH AND COLONELS EVANS, MACIA AND [illegible] HAVE COVERED THE CONTENTS OF THE REFERENCED MESSAGE. THERE IS, HOWEVER, AN IMMEDIATE NEED FOR A BRIEFING AND WRITTEN DOCUMENT BY AFCIN ON INTELLIGENCE REQUIREMENTS AS THEY PERTAIN TO WS 117L. IT IS REQUESTED THAT SUCH A BRIEFING FOR AFBMD AND ARDC PERSONNEL BE ARRANGED AT AN EARLY DATE. EMPHASIS SHOULD BE PLACED ON THE TARGETS REQUIRING SURVEILLANCE; THE CHARACTERISTICS AND NUMBERS OF THESE TARGETS; AND THE FREQUENCY OF SURVEILLANCE NEEDED FOR THE TIME PERIOD STARTING IN CY 1961 AND EXTENDING AS FAR IN THE FUTURE AS IT IS POSSIBLE TO FORECAST AT THIS TIME. SUBSEQUENT TO THE RECEIPT OF THIS INFORMATION, THE OTHER ITEMS CONTAINED IN YOUR MESSAGE WILL BE DISCUSSED IN A TIMELY MANNER.

DATE	TIME
29	
MONTH	YEAR
DEC	1958

SYMBOL

TYPED NAME AND TITLE (Signature, if required)

PREPARED BY [illegible]

SECU[redacted] 1 1

SIGNATURE SIGNED

TYPED (or stamped) NAME AND TITLE

O. J. RITLAND
Brig. Gen., USAF
Vice Commander

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WDZW 66-[illegible]

291

HEADQUARTERS
AIR RESEARCH AND DEVELOPMENT COMMAND
Post Office Box 1395
Baltimore 3, Maryland

Amend. No. 1 to
SDD No. 117L
28 August 1956

AMENDMENT TO ARDC SYSTEM DEVELOPMENT DIRECTIVE ADVANCED RECONNAISSANCE SYSTEM

1. AMENDMENT

ARDC System Development Directive No. 117L, dated 17 August 1956, is amended as follows:

a. Add to paragraph 4, as follows:

"e. Priority-Precedence -

The Advanced Reconnaissance System is currently assigned a development priority of 1A, and USAF Precedence List rating of I-6." (UNCLASSIFIED)

BY ORDER OF THE COMMANDER:

Don R. Ostrander
DON R. OSTRANDER
Brigadier General, USAF
Ass't for Guided Missiles Systems
Deputy Commander/Weapon Systems

UNITED STATES AIR FORCE
Headquarters Air Research & Development Command
OFFICIAL
AUTHENTICATION

JOHN A. CONNOR
Chief, Fiscal & Documentation Branch
Executive Office
Deputy Commander/Weapon Systems

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